COAL AGE

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The Million-Dollar Man

By Floyd W. Parsons

This is a true story. It is the romance of the youngest of America's "Captains of Industry." It is the story of a poor boy grown rich—not in an hour by a lucky strike, but by toiling day and night for seventeen years. Even when hope ran high, back in those college days at Lehigh, it is doubtful if Gene Grace looked out of the classroom windows at the long line of smoky buildings below and dreamed that in a short period of time he would be president of "Bethlehem." Yet, if he did, it is a dream more than come true, for Bethlehem steel today is a giant compared with the doubtful concern Charlie Schwab bought for less than eight million dollars in 1901. Back in those college days at Lehigh, Gene Grace, with his brother "Gator," lived in a little hall bedroom not far from the University. They lived there not only because they could work better when isolated from the others, but because the Grace boys couldn't afford to live in the clubhouse with their fraternity brothers. In spite of Gene's good fortune in gaining two years' free tuition through his excellent scholarship, he owed the college one year's tuition on graduating. Settlement of this debt was the use he made of his first earnings. Today he is a trustee of the University that extended him credit as a student. If you see Lehigh play football, you are likely to sit in that section of the fine concrete stadium presented to the college by Gene Grace.

COAL AGE has never gone out of its field for its stories of success, and it does so now, not because it has exhausted the possibilities that exist in the coal fraternity, but because Gene Grace is the most successful young man in America, and it is deemed appropriate in this Special Success Number to freshen things with a new viewpoint. After all, the art of getting ahead in our industrial life is based on the same principles, whether we mine coal, make steel or manage a railroad. There isn't a coal man in America but will gather a helpful thought and find inspiration in this story of the president of "Bethlehem."

Some have said Gene is a lucky fellow, but those who know him do not attribute any of his success to chance. There wasn't any romance or glamor attached to his first meeting with Charlie Schwab, the master of Bethlehem, back in 1904. Gene was superintendent of yards and had to oversee the switching of the big boss' private car. Schwab noticed the thoroughness and the systematic effort of the young man hanging onto the rear of his car, and Gene was marked for future observation.

Did Schwab make a mistake? Evidently he doesn't think so, for he has said President Grace's services were cheap at better than a million dollars last year. Arch Johnston, vice president, blue ribbon salesman and special ambassador of Charlie Schwab to the crowned heads of Europe, says Gene earned all he got; and he added that he got it in real money, not the kind they pass on the stage. Arch ought to know something about the validity of those bonus checks, for last year he himself landed a lump sum that looked well in six figures.

Many men have investment incomes exceeding that of young Grace, but I doubt if anyone in any country is being paid higher wages for ability alone than Bethlehem's president. I asked several of the vice presidents at Bethlehem to explain the rapid rise to power of President Grace. Their answers condensed are interesting. One said: "He never loses his head. I have been associated with him from the beginning, and I have yet to see him lose control through anger. He may be mad all through, but he won't show it. He is a glutton for work—never stops. However, his chief quality is his ability to inspire confidence. Those associated with him are never left in doubt as to plans and policies. He doesn't wobble." Another vice president attributed Mr. Grace's success, above all else, to "good judgment." He said: "You can always get a decision from the Bethlehem president, and you can get it *now*, except in rare cases where additional information is asked for. He does not hesitate to take chances on being right, and when it comes to picking winners, he is uncanny. He has intuition reinforced by deep analysis, and is always outthinking his job."

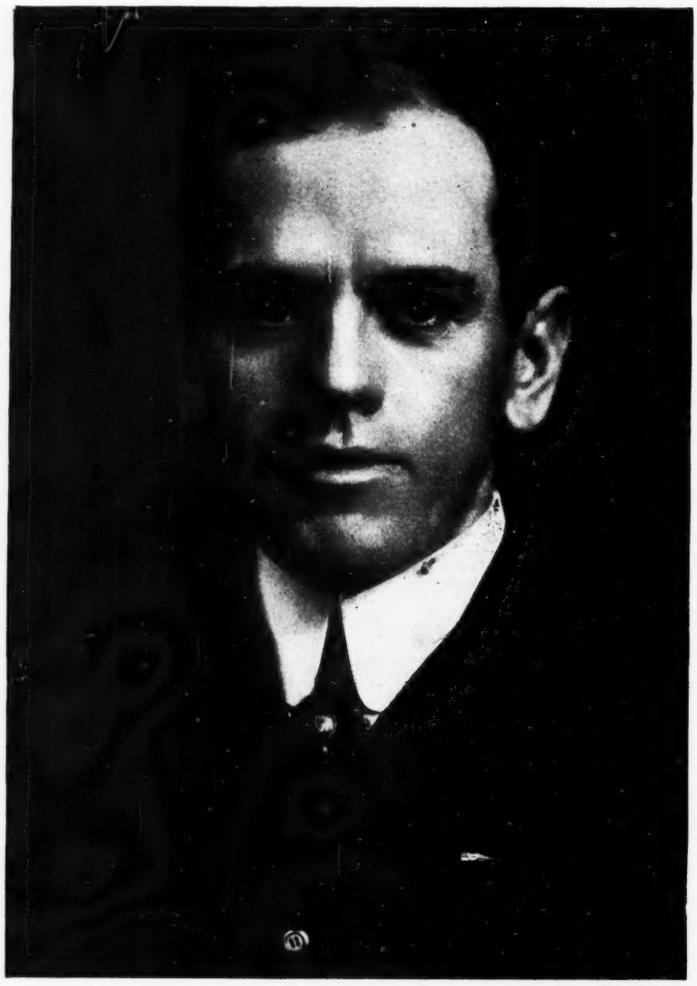
Still another vice president believed Mr. Grace's predominant business virtue is his never-wavering sense of justice. He is human all through and has been able to create a feeling of security on the part of the rank and file in the works. The lowliest boss in the plant knows that if "E. G." decides against him, the decision was based on a fair consideration of all sides of the problem, and the sting of losing is removed when it is known absolute justice prevailed.

I managed to corner Mr. Grace at his New York office—he comes over to the big town two or three days each week. I had to fit in between a couple of French committees and several other important looking foreigners, so that I lost no time in getting down to brass tacks. "To what do you attribute your success?" I asked. His reply was instantaneous: "Two things—*concentration* and *integrity*. I give 100 per cent. attention to each matter that comes before me. I banish all else from my mind but the single problem in hand. When I am debating battleships, they alone occupy my thoughts; fifteen minutes later I have my mind on steel rails or something foreign to war, and then my entire attention, not part of it, is devoted to that subject. Concentration makes a mediocre man brilliant;

dividing one's attention makes an unusual man seem stupid.

"Integrity is a prime essential to real success. A crook can pile up money, but riches are not important without honor and the respect of your associates. I always keep my word and never promise what I can't fulfill.

"I insist that none of our men make a contract that the company can't live up to fully. Any salesman discovered making an agreement in which is inserted a clause giving the company a loophole to escape from so filling the contract, will be given ten minutes' notice. That's understood by all, and so far I haven't had to enforce the threat. Never refuse to shoulder responsibility. It is less discreditable to make an error than to be afraid to try. If a man can be right 51 per cent. of the time, he will succeed. Do not temporize. If you are going to say 'No,' say it now. Don't build false hopes. A man can respect and appreciate the fellow who doesn't agree with him, and says so; but he has good excuse to hate the man who procrastinates and thereby misleads him. Some men fail to build up understudies. Through ignorance or fear, they prepare no one in their department to succeed them. Such men are not only blocking their own further advancement, but they are laying the foundation for early dismissal and ultimate failure in their profession."



E. G. GRACE, PRESIDENT OF BETHLEHEM STEEL CORPORATION, WHOSE MOTTO IS "DO IT A LITTLE BETTER THAN THE OTHER FELLOW, AND DO MORE OF IT"

Right here I ventured the question: "Your company is famous for its bonus system; what do you think of the plan?" "Fine!" said Mr. Grace. "Every company should endeavor to so provide for its men that they will not have to worry about financial affairs in their home. Once a man knows his family is provided for, he can give undivided, enthusiastic attention to his work. Worry more often than inability causes inefficiency.

"We pay our bonuses monthly, shortly after the salary checks are sent out. This causes each employee to be constantly keyed up to the highest possible pitch of efficiency. Payment is made for the work on which that particular individual was engaged, and no other. This applies to each worker in the organization, except the executive officers, whose work covers the entire company and who must, therefore, be paid on the general results. Salesmen working on the bonus plan are paid, not on the tonnage they sell, but on the profits that result to the company from the sales they make. This discourages price-cutting to secure business and encourages the exercise of the salesman's maximum efforts to obtain the best prices the market will afford."

I asked Mr. Grace to outline the Bethlehem policy of selecting men for advancement. He said: "We make our big bosses from the little men in the company; that is, we aim never to go outside our own organization to get a man to fill a position. Mr. Schwab, when he came to Bethlehem, selected fifteen men to take charge of the company's operations. Only one of these fifteen officers and directors was brought in from another company. We believe that the sure way to kill initiative and throttle the enthusiasm of our faithful men is to fill our important positions with strangers from other companies. If a man isn't worth advancing, he isn't worth keeping." Asked as to his ambitions for Bethlehem, Mr. Grace replied: "The sky is the limit. We are now planning to spend more than $100,000,000 on improvements and enlargements. Our thoughts are running to the days after the war, and we expect to be as well prepared to manufacture implements of peace as we were to produce munitions of war. We don't any of us at Bethlehem believe much in luck. We think that foresight based on common sense is the real key to success for a corporation or an individual."

"What about the curtailment of profits on munitions for the Government, now that the United States has entered the war?" "We are not worrying about the treatment Uncle Sam will deal out to us," said Mr. Grace. "The Government is becoming more and more a partner in our business, as it is in all the rest of the nation's industries. Don't forget that Federal taxes on corporation earnings today are far greater than in past years. We expect to be allowed a fair profit on all we produce, but Mr. Schwab and the other owners of the property have no unpatriotic desire to grow rich at the expense of our nation through the misfortunes of war. We have already offered to make armor-plate for the Government at its own price, and in our recent bids on the new battle cruisers we offered to leave the determination of the percentage of profit to the Government itself. Since the war started, we have adhered

in our charges to the United States Government to the basis of prices established before the war began."

The foregoing are the chief thoughts Mr. Grace left in my mind. After my talk with him and my investigations at Bethlehem, I am ready to join those who believe Charles M. Schwab stands alone as a judge of men. In these serious days of world reconstruction, the greatest gift "C. M."—as the boys at the works call the master of Bethlehem—can give to his country is the services of Gene Grace and the clever young men who surround him.

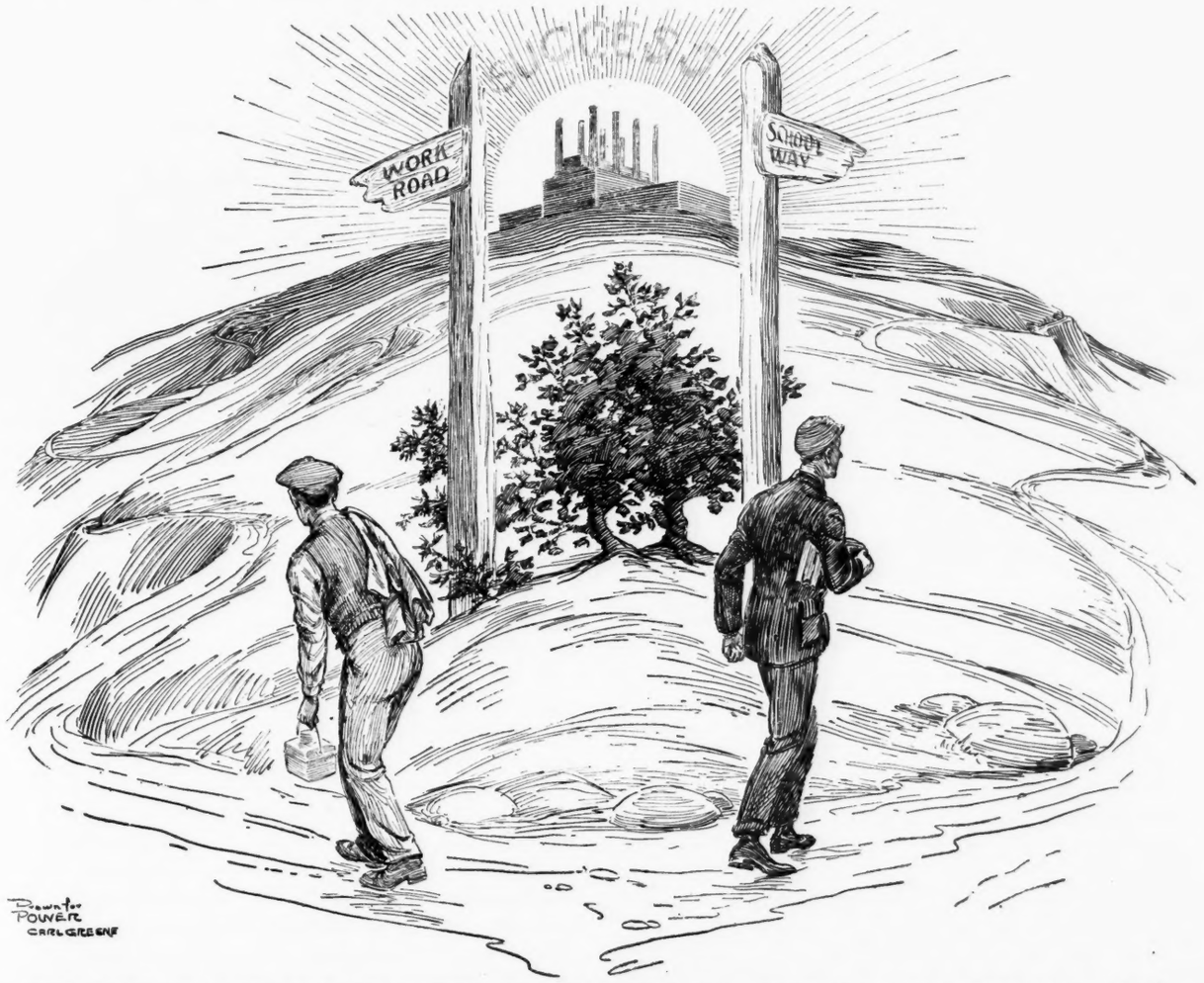
At Bethlehem is the greatest ordnance plant in the world. It is 50 per cent. larger than the monster Krupp works in Germany. The Bethlehem plant now can produce nearly four times as many munitions in a month as could be turned out in a year by the entire ability of the United States prior to the war. In 1915 Bethlehem employed 23,000 men, today more than 70,000 are in its service. In 1915 the total payroll was less than $23,000,000; in 1916 it was more than $72,000,000. Schwab says that every man and machine will be available to the Government the minute they are needed.

The Bethlehem corporation is building fully one-third of all the ships now under construction in this country. Besides battleships, submarines, etc., it is completing one 10,000-ton fully equipped merchant vessel every week. But—and here's the rub—more than one-half of all the ships building in the United States today are for foreign owners. The American merchant marine in the past two years has shown an increase of about 1,000,000 gross tons. However, if present conditions and restrictions apply to ships flying the American flag after the war, American owners will *again transfer their vessels to foreign registry.*

Briefly, these are the facts concerning our big national war plant, located in a quaint Dutch town named after the birthplace of the "Prince of Peace." Every man, woman and child in this great republic is safer for the brains and efforts of Gene Grace, the lean, energetic leader of 70,000 brawny workers equally skilled in the production of implements of peace or weapons of war.

As I left him he smiled and said: "After all, playing the game in business isn't any different from the way we used to play baseball on the Varsity at college. The fundamentals and the rules are both quite the same. If you remember, it wasn't the fellows who did something spectacular once every year who could be depended upon in a pinch. The average every-day plugger is far better than the player who knocks the ball over the fence once in a season and strikes out every other time he bats.

"Making a hit is only a start on the long journey home. It avails but little to get on first and then get caught napping. And when you get on base, there's no way to score unless your team-mates do some good, safe hitting. Moral: It takes earnest coöperation to win in business, just as it does in baseball."



MORE THAN ONE PATH LEADS TO SUCCESS. REACHING THAT GOAL DEPENDS ON THE STUFF IN THE MAN MORE THAN ON THE ROUTE HE TAKES

Ideas and Suggestions

A Successful Steel Mine Tie

By Clyde Elkins*

About eighteen months ago the Washington Coal and Coke Co., of Star Junction, Penn., installed some 7000 steel mine ties. These were made by the Cambria Steel Co. and are known as the Slick mine tie. They are used chiefly in room development and entry driving, and help to accelerate the driving of these to a finish.

Where the cutting of coal is done by chain machines, there is made an excellent road bed for these ties and iron rails. The ties are thin and require no channels to be dug, which is a great factor in keeping the steel rails in good condition. When wooden ties are used it necessitates spacing them very closely, or otherwise there will be kinks or curves in the rails; thus steel ties prolong the life of the rail. These steel ties were spaced on an average of 5 ft. apart, some less and some farther, according to local conditions.

We have been making turns into cuts on pillar drawing and find that the Slick mine ties are more convenient and require less time in handling than the clumsy wooden tie. These steel ties are popular among the miners, roadmen and foremen as they simplify track laying and are more economical than the wooden tie for the reason that they are used time and again. Under normal conditions they should last about 10 years.

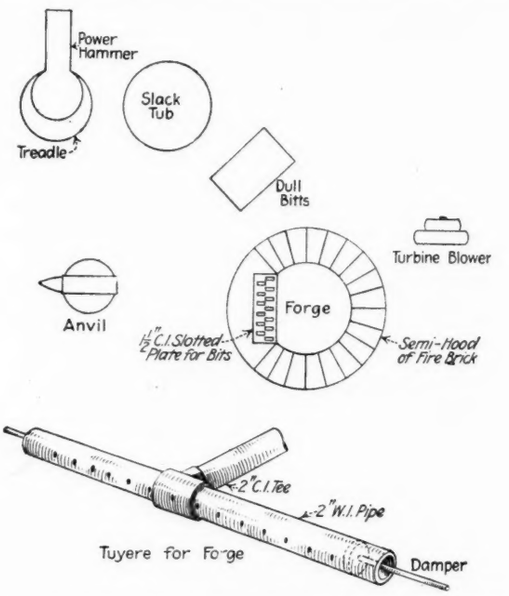
It is possible for two men to transfer easily one 15-ft. section of track made with the Slick tie and 20-lb. rails. Another argument against the wooden tie is that the miners frequently cut them up for cap pieces, and the spikes are often lost. There is no waste in using the iron tie, as the buttons remain on the ties. All that is necessary is to give a one-quarter turn on the button with a wrench, and the tie is held fast to the rail.

A Modest Effort in Scientific Management

The sharpening of bits for coal-cutting machines often assumes large proportions. When done by hand it is arduous work. One ingenious superintendent decided to improve on the old hand method and purchased a Little Giant power hammer, to do the heavy work. This improved conditions, but still the blacksmith thought he must resort to handwork for finishing. His movements in heating, handling and tempering bits were many and awkward. Accordingly, after some study and experiment, the following system was devised.

Around the forge a semicircle of firebrick about 2 ft. in diameter and 9 in. high was built. The distance across the opening of the semicircle was about 18 in. Across this was placed (when bits were being heated) a piece of 1½-in. cast-iron plate 20 in. long by 10 in. wide in which were cut about 30 slots ⅝ x 1½ in., for receiving the dull bits. The iron was inclined toward the fire and the points of the bits were on the fire side. The tuyere of the forge was made of 2-in. pipe perforated as shown in the accompanying drawing.

The equipment was arranged as shown in the sketch, with such spacing that the blacksmith operates the treadle



ARRANGEMENT OF TOOLS AND DETAILS OF TUYERE

of the power hammer with his left foot and easily reaches the forge, dull bits, slack tub and hammer without taking unnecessary steps and with single movements, all finishing being done by the power hammer. He can now sharpen 55 per cent. more bits with at least that much less labor on his part.

The Successful Timekeeper

Every mining concern must have timekeepers, but every concern does not have *successful* timekeepers, principally because most have yet to realize the possibilities that are inherent in the position though too often undreamed of by the timekeeper himself.

Because a timekeeper is entrusted with the handling of the most valuable asset of any group of workmen—their earnings—and the greatest single liability of every company—its payroll—most men and most concerns have come to believe that timekeeper successful who jealously guards his payroll by honestly recording earnings and faithfully disbursing the money equivalent. It is also true that the majority of mine timekeepers have fallen into the same error of thinking that honest and faithful performing of timekeeping duties constitutes success.

Both manager and timekeeper of any concern will do well to discard such a definition of success in timekeeping work. There is a larger measure of service than is

*Star Junction, Penn.

comprehended in mere honesty and accuracy in work. It is nothing less than the recognition of the fact that every timekeeper is the point of contact between the company and the men. He acts—whether or not he is aware of the possibilities latent in such a capacity—as the conductor of that intangible something that stands for the relations between the men and the company. He can do as much, or more than any man, to bind the company and the men together with bonds of good will, or he can build up a strong dividing wall of prejudice.

That company is fortunate—and even superior to others—that recognizes this factor of success in its timekeepers. Men are drawn nowadays more by the human elements of a mine operation than by its schedule of wages. They know that the point where they will most frequently make direct contact with the representatives of the management will be at the time-office window. The treatment they get there will either draw them closer to or repel them utterly from that concern. A company to be successful must recognize the human element in men which cannot be successfully ignored. The timekeeper must be recognized as the peculiar representative of the company and as the differential gear in the machinery of organization.

The successful timekeeper must become aware of his responsibility as the transmission wire for the human policies of his concern. If the company is dead to the principles of humanity in business, he should get away from such an organization. He cannot work for it and be a really successful timekeeper. Neither can he be a success if he believes that honesty and accuracy are the only essentials of success in his work. They constitute only the body of the business of timekeeping. The big and vital thing is the *spirit* in which he serves as the guardian of the company's payroll and the custodian of the miners' earnings.

Timekeeper Shock-Absorber of Business

The successful timekeeper must be courteous rather than curt in his dealings with the men. Many an honest and accurate payroll clerk has been lost in the discard because of uncontrolled temper and scolding tongue at the check window or pay office. Too many have never learned that a courteous clerk is worth far more to the concern employing him than the man who lacks this asset. The attribute of courtesy in a timekeeper is worth more to any mine concern than absolute correctness and honesty in work. If a timekeeper cannot learn to be courteous, he is unsuited for his job and can never be successful in it.

That timekeeper who has not learned that all men of whatever rank and station are entitled to courtesy at his hands should be observed carefully by his superiors. He is a dangerous unit in the organization. A cheap differential is no part of a good automobile, so no such timekeeper should long find a place in any business.

The most successful timekeepers are those who learn the language and human characteristics of the men they serve. Are most of your men foreigners? Spend some time in the study of their languages. Learn to say "Good Morning," "So Long" and "Good Night" in their native tongue. It sounds like music to them. Are you keeping time at a Southern mine where the negro is the principal labor factor? If so, don't fool yourself into believing that because you are a white man you'll win his respect and friendship by calling him "nigger." Call him by name or give him a friendly alias. He won't mind the latter a bit, because he generally carries one with him. In fact, if you win his friendship he is likely to take your name to the next place he works. I know some Southern timekeepers who have scores of negroes carrying their names, won to loyalty by friendly treatment at the check window. If you can't think of a name or an alias, call him "Old Man." He always responds to that.

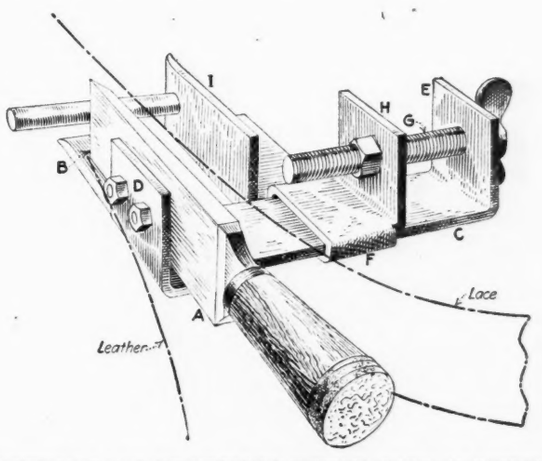
Learn to "can" the harsh word and the scolding tongue. Answer a man's questions courteously—just as you would want your boss to talk to you. A man has the right to ask questions about his time. You will serve yourself and your concern by answering him kindly.

Finally, never forget that those superior in degree or station can dignify such rank only by giving the courteous, kindly treatment due to those of inferior rank or intelligence. Speak first and speak courteously to the men at your mine. In doing this you will gain their lasting respect and friendship both for you and your concern.

Courtesy in a timekeeper is an unfailing asset and the true measure of his success. Curtness is the unfailing mark of failure.

Gage for Splitting Belt Lace

A practical device for splitting belt laces can be easily and quickly made as follows: It consists of three principal parts. *A* is a knife or wood chisel sharpened at the end and cuts with the front edge *B*. It is fastened



CUTTING LACE OF DESIRED WIDTH FROM LEATHER

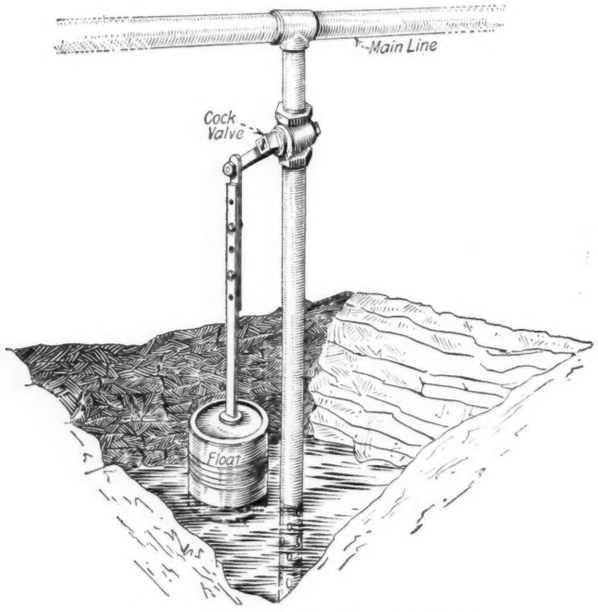
to the bent-up part of *C* (marked *D*), which is made of brass or iron plate, with two small bolts. The opposite end *E* is likewise bent up, after *F* has been slid on, and has a hole for the adjusting screw *G*. The third part *F* is made so that the loop *F* can slide over *C*, and part *H* also has a hole for the adjusting screw. A guide *I* for the side of the leather has a top guide, which serves to keep the leather down flat.

The leather is placed on the floor or bench and the screw *G* adjusted to the desired width of the lace. A cut 3 or 4 inches long is first made in the leather the width of the lace and serves to get a right start. This part of the lace is put between the knife and the guide, and the leather is held with the left hand while the right hand pushes the device forward, raising the leather slightly from the bench.—B. Z. Reiter in *Power*.

An Automatic Suction Control

At some mines where several pumps are required, each drawing water from several sumps, unless some kind of automatic suction-control device is employed more than one pumpman will be necessary to keep all the pumps in efficient operation.

The accompanying illustration shows a device I have found useful for governing the flow of water from the various sumps to a single pump. It consists essentially



THE SUCTION CONTROL IN A SUMP

of a cock in the sump suction line, a float in the sump and a suitable rod and lever connecting the two. When the water in the sump rises, the float opens the cock; when it falls, it closes it.

For a float I use an old powder keg. The hole, of course, is first effectually sealed after which the can is given a good coat of paint. This answers the purpose fairly satisfactorily. By means of the above-described apparatus several sumps may be kept pumped out without the continuous care of the pumpman.

"Make Good"

"He's made good!" Do you catch the thrill wrapped in those magical words? Suppose you should overhear some one say it about yourself—"He's sure made good!"

Making good is not an accident, and much of the romance of this work-a-day world of ours is stored within those words. You know men who have made good, and it's but human to look up to them and wonder how it's done. Yet when it is deduced to its final analysis, it is but the simple tale of work well done—a means within the grasp of everyone, whether he be a laborer in the mine or an executive in the office.

Aye! but it's great to make good! What's that? The carping critic now intrudes and says the expression does not square with grammar! Well, mayhaps 'tis true that it will not stand the acid test of those who swear by the book and delight in sending words through their paces.

But what of it? No one can mistake its meaning, for does it not perform the very first office for which speech was invented—to give expression to the mind? Primitive man first learned to talk by pointing at objects and giving vent to guttural grunts that finally came to be words. Speech came first, then grammar, and the latter has always remained a few paces behind.

Thus it is "make good" sounds good—is good. Man's chiefest delight has always been in making good. Don't you remember the time when you were a kid—O, glorious days—trying to make good in school and the teacher caught you doing sums on your fingers beneath the desk? What a tingling when she reminded you that fingers weren't made to count with. But they were! That's just the way the primitive man we were talking about made good. He used them to learn to count; but whereas we were limited in school to ten, he went up to twenty because he wore no shoes, and with every twenty he scratched on the ground with a stick and called it "a score!" And how proud he must have been of this achievement, for had he not made good?

Yes; make good is good. It's American, too; typically so. Just as we Americans with our land of the open ranges and towering hillsides absorb the very strength of our glorious country, with its countless opportunities of making good, we also vivify the very language until it becomes typical of our achievements.

Make good is a true Americanism and we are proud of it, just as we are even at this moment beginning to stir our pride in many other things in this land of promise and of opportunity.

Opportunity! This word has been slandered and maligned in song and proverb because it was supposed to happen about once in a lifetime. As a matter of fact it hangs around every street corner and would actually be a loafer were it not for those wise enough to see it and grab it up and make good.

That's the formula—opportunity and you equals "Make good!" Every man has a chance to make good—we must make good, for the world expects it of us. And you need no better opportunity in which to enjoy the thrill of those words than in this business of helping the world to its fuel supply. It's a big business and will make those of us big who honestly strive to make good.

More people are going to make good these coming years than there have for many a day. These present days are going to be talked about to future generations as the good old times.

Start now. Make good! Let us sound to the depths of the full meaning of the words. Be deaf and dumb to the whisperer who suggests "Fall down" in place of "Make good." We are out to make good, and when the history of the years is written what a glorious thing it will be when your page reads "He made good!"

NOTHING SUCCEEDS LIKE—

Study
Uprightness
Courtesy
Conscientiousness
Energy
Saving
Stick-to-itiveness

Successful Wives in Coal Camps

By Josiah Keely*

"Whom the gods would destroy they first make mad," is variously quoted and variously applied. One is certainly taking long chances with the god of success when he reaches that point of madness which prompts him to write about wives. And yet, as a success factor, wives must be reckoned with.

The mining laws forbid their very presence in and about the mines, and one has a feeling that it is not entirely a chivalrous law; for in most places there is a superstition that a woman's presence in a mine brings bad luck. I have known miners to take their tools out and leave the mine because women visitors were permitted to enter. Aside from the popularity of miners "with families," emphasized by labor agents, the wives of the coal people receive scanty attention in the literature of the profession.

The very popularity of the Success Number of *Coal Age* is owing quite largely to the fact that it tells of the struggles of men of small means, up through the tribulations of camp life to "Easy Street"; and it is often a pathetic fact that much of the promotion has been made possible by the loyalty of the wives, who efface themselves in direct proportion as the successful husband rises. From the very nature of things, the majority of our successful coal men are experienced employees to start with, rather than capitalists seeking adventure. Their successes have thrown them in with capitalists and made capitalists of them, or at least has made them eligible to the good fellowship of the profession, through the various coal organizations and fraternal orders that recognize successful men.

So far, the statement of the case has had application to the coal industry, only in so far as it may be a little more common for a successful coal man to be what we know as "self-made." It is no new discovery that wives do not often have the opportunity to grow and broaden into the spheres of life attained by their successful husbands. This has been remarked so often that it is only touched upon here in the light of a truism, to be accepted rather than argued in the case we are trying to make out for successful wives in the coal camps.

A few sentences back I used a well-worn expression about wives "effacing" themselves. This is not quite accurate; not that anyone in a coal camp could notice, at any rate, and, for the present, I will broaden my idea of successful men to include all who have started in the race for promotion and have not yet "arrived"; those who, in other words, are still in the running.

Now, that which makes a wife particularly lovable is that she believes her husband is her own particular discovery, and, that having made a study of him, she is better qualified than any other living authority to pass on his fitness to be the chief consideration on the works. It is not always her fault that she has formed this opinion. She has not the opportunity to see him in action and gets most of her information second-hand, either from other wives or from the head of the family himself. If it is from other wives, he is simply used as a foil to make the real man a performer of the first magnitude; but if it is from the man himself that she gets the details, no matter how modest he may be he soon makes it apparent to her that if his fuse should burn out, the whole plant would be in darkness. Now, I do not believe I would be hated over much if I made the statement that when a wife has to choose from two versions of any account she selects the one that pleases her. Men do the same thing. But I am only leading up to the life of the camp, and to successful wives.

The same madness that suggested wives as the subject of an article for a coal-mining magazine is now about to manifest itself in other evidences of radicalism. I would like to make the tentative statement, to be qualified perhaps later, that the coal camp should be made up of all the people in the coal business with the possible exception of those who sell the product, and maybe they ought to be in the camp when they are not selling coal. One of the first evidences of an otherwise successful coal man's disposition to slow down, to lose steam, and to "arrive," is a move to establish himself "in town" and from this center of social life to "visit" the camp. This practice is common enough on the part of the higher salaried men to almost form a precedent. No wonder that the good wife who has social aspirations looks forward to the time when her husband shall reach this goal. She has tried hard enough in camp to establish her claims to distinction.

Entering Into the Camp Life

If any one thing more than another has fostered the clannishness that finds expression in the labor unions, it is perhaps the tendency to neglect the camp, and, by living outside, to diminish the sympathies that ought to grow up between people living in the same small town and engaged in the same business. "Enter into the life of the camp," is an expression that I have used a good many times in the past few years. This ideal camp should be made up of the general manager, general superintendent, heads of departments, superintendents, mine foremen, assistants, and the men, with their living quarters arranged in reference to their work. But this is just the beginning of an ideal camp. They have simply answered, "All here." The entering into the life of the camp is where the real success is made—and here is where the wife makes or breaks.

This ideal camp does not include a system of "slumming" societies, and uplift work as such. If I understand miners, they want to be let alone; but they want to see how others live and do things, and to feel in a way that the officials and their families learn at first hand what their lives are and understand them. The Sunday school, the church and the moving picture show are places that should have a plentiful sprinkling of officials and officials' wives. The teachers of the public school should have recognition and encouragement. All school entertainments should have the backing of the women of the town. There are dozens of tactful things a successful wife can do to make the camp a success without the company having to hire professional uplift workers.

And then there is the "neighboring." Of course, it is natural for women to group themselves into inner circles of friendship; but the successful wife recognizes the logical group and avoids rivalries and studied attempts to get ahead of this one and that one, or to take on a slighted air when not included in this or that social gathering.

As social distinctions in coal camps are often based on the line of work the husband is doing rather than the

*Cabin Creek Consolidated Coal Co., Kayford, W. Va.

amount of money he is making, this can be made a fruitful source of much unnecessary friction by the unsuccessful wife. The successful wife should look on camp life much as the passengers do on an outgoing sea voyage. Everyone who behaves himself is a neighbor, a comrade in a temporary situation, a fellow in misery—if one is pleased to look at camp life in such a light.

The ridiculous thing is to see really likable women accepting the camp life as a serious station in life where the conventions of society should be observed, or where they have a position to maintain. It is taken for granted that many of the wives of coal men have more or less distinguished connections out in the bigger world, who are "somebody," but in the comings and goings of such it is not always taken for granted that they have sense enough to distinguish between the attachments of camp neighbors and the friendships naturally growing up between people of like tastes and like advantages; and a foolish avoidance is shown which in polite circles is known as snobbery.

Then there is the wife who takes advantage of what she believes the security of her husband's position to make special demands of the company in the way of conveniences or ornaments; the wife who, when her man gets a raise, puts the advance in a new hat for the admiration of her neighbor whose man did not get an increase; the wife of the new official who does not measure up to the wife of the man who formerly held the position; the wife who has never associated with the women at the mines; the wife who was a miner's daughter and whose husband has become somebody with the company; and so on down to the wife with the scandal to her name—all recognized in every coal camp and a more or less potent factor in the success of their husbands and the company. When work is slack and the miners are drawing poor pay, how many of the officials' wives whose husbands' salaries are not affected think of modifying their manner of dressing so as to prevent envy and sullenness in the miners' women as they pass in their daily walks about the camp? How many save their fine feathers until they go away from the mining community?

On an investigation into labor troubles, a Senator asked an old man who had made a study of this subject, "Why this bitter feeling against the company?" The answer was, "The fine homes of the coal barons on Front Street." Perhaps the old man was "warm," but he would have been "warmer" had he said, "The wives of the officials in the coal camps."

When the miner comes to town he expects to see fine houses—that is what a town is for. But richly dressed women parading through a mining camp have about the same effect as a bird of gorgeous plumage feeding among sparrows—they all want to peck at it.

As a matter of fact, the "glad" clothing is not worn to flaunt in the faces of the miners, but for more or less well defined effects to be produced on the "society" of the camp. So far as success is concerned, however, the results are the same. When a man applies for a position we do not ask him, "What kind of a wife have you got?" But we do attempt to find out from somebody else.

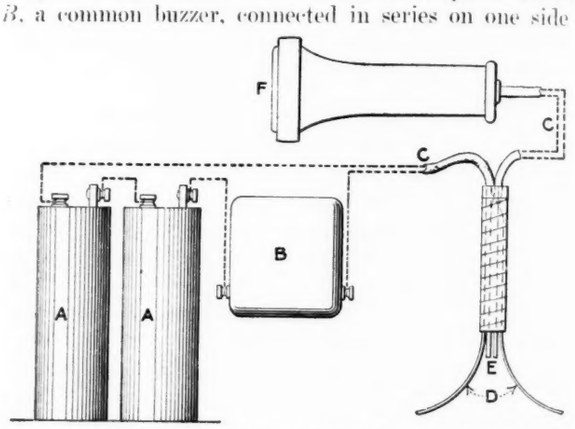
Successful wives are those who enter into the life of the camp and help their men safeguard their jobs, make promotions possible by showing that loyalty to the company can be practiced as much by the wives as by the men, and that "public sentiment" in the camp is more nearly in the hands of the women than of the men.

An Armature-Testing Outfit

By C. J. Fuetter*

Almost every electrician has at one time or other wished he had some kind of light, reliable outfit to test armatures for short circuits, without going to the expense of buying a low-reading voltmeter or other apparatus. The equipment shown in the accompanying illustration is reliable and convenient; it weighs about 5 lb. and can be carried and used anywhere in the mine, as no current other than that from dry batteries is required.

The device is not new, but it is an improvement over those commonly used. For the benefit of the mine electrician who wants to build one, I give the following description of the outfit. *A* is a two-cell telephone battery; *B*, a common buzzer, connected in series on one side of



HANDY OUTFIT FOR TESTING ARMATURES

the cord; *C* is a piece of lamp cord, made as long as desired. Two strips of spring brass, about 6 in. long, $\frac{1}{16}$ in. thick and about $\frac{1}{4}$ in. wide, shown at *D*, are bent in the shape illustrated. The two terminals *E* of the telephone receiver are brought between the brass springs, and the four adjacent contacts are insulated from each other and taped over, so as to form a hand grip.

In use the springs are pressed against the commutator until the points *E* are in contact with two adjacent bars; the receiver is held close to the ear. Armatures with different resistances will give different intensities of sound. If a uniform sound is given all around the commutator, it is free from short circuits. An open circuit will give a loud buzz, a dead short will give no sound at all, a slight short will give a weak sound, according to the extent of the short in the coil, or commutator. With a little practice, this little outfit is almost as reliable as any high-priced fault-detecting instrument.

Workmen's Compensation

By Sim Reynolds†

The most outstanding success registered in the coal fields of Pennsylvania and other mining states can be summarized in two words—Workmen's Compensation. The practically universal benefits resulting from this act of the Pennsylvania legislature overshadows—in its service to everyone directly or indirectly affected by the hazards inseparable from coal mining—any other "success," whether of man, machine or method. Workmen's

*Van Lear, Ky.
†Mine inspector, Houston, Penn.

compensation by one move created justice where hitherto injustice had existed, certain independence where uncertain charity had confronted the injured workman and his dependents, and fair dealing in lieu of the customary delay and law suits.

The records of the Department of Labor and Industry of Pennsylvania, covering only the first six months of 1916 (the first half-year in which compensation was on the statutes), give the astounding total of 121,180 killed and injured in all trades covered by the act, of whom 1136 were actually killed or died from their injuries. In view of such authentic records, in the compilation of which our own industry no doubt plays the far larger part, one begins to realize what widespread service to the widows and children and to permanently injured workmen this act has given.

Instead of only a meager 35 per cent. reaching a few of those to whom compensation was due, as in the old order of things, practically 100 per cent. is now available for those who are entitled to compensation, and that without unnecessary delay. The facts already evident and on record make apparent the possibilities of the act for public welfare and individual happiness (or as much of it as can be expected under such circumstances). Compensation due and awarded enables mothers to keep their children with them, give them the measure of schooling which is their due, provide shoes for little feet which would otherwise be cold and food for little stomachs which under the old order often went empty. Many orphans, instead of being left in need, and widows, thrown upon the charity of their neighbors, are cared for properly.

That the employees and their dependents are not the only beneficiaries is patent to the observer who is conversant with mine conditions affecting the upper strata as well as the lower, the mansion as well as the "company house." The need of the former was moral and spiritual, as the latter's was physical, and both are being fed at the same fount. Both almost equally felt the injustice of things as they were before the passage of the act, yet both were powerless to help themselves. Regarding this, one of the largest coal operators in Pennsylvania recently said to me that "while it was always, as it is now, a sad thing to me to hear of one of my workmen being killed or badly injured, yet there is—now—a measure of relief in the knowledge that provision has been made beforehand to look after his widow and children, and that we are not required, as a matter of business justice to our stockholders, to be on the defensive against those whom humane feelings taught us were deserving of and entitled to our support."

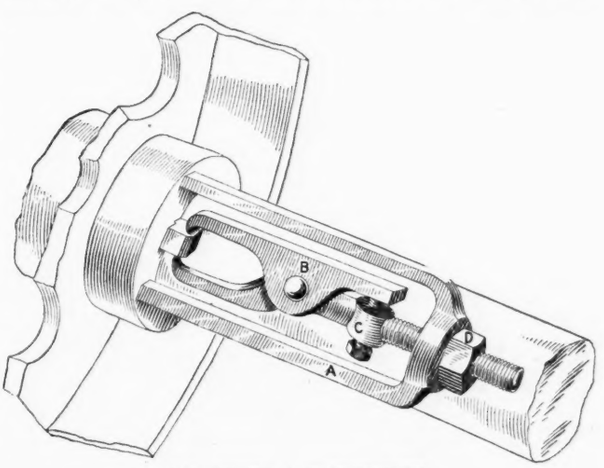
Not long ago I received a letter from a friend in West Virginia, who in 1910 sat at a Mining Institute in that state when I read a paper advocating the passage of a Workmen's Compensation Law such as now exists. At that time he censured me roundly for having "radically socialistic tendencies," or, as he later modified the virulence of his statement, "being at least ten years ahead of the times."

Being more of a practical mining man and observer of things as they are than a reformer and prophet of things as they should be, and must be sooner or later, he failed to see Workmen's Compensation as some others saw it—an inevitable part of the natural evolution of coal mining and a phase of that human right and justice which is bound to override all obstacles and triumph in the end. Since then he has seen its actual working out in the manifold blessings it has brought into thousands of homes in the mining camps of "The Mountain State," and he apologized, tardily but sincerely, for his attitude of an earlier day.

Individuals may in themselves, or in the inventions of their brains, be really "a great success" and an honor to our industry and to all men, yet, if one measure ultimate "success" by the totality of real human service given, I personally give the palm to Workmen's Compensation, as it now affects everyone identified with the mining of coal.

Device for Drawing Tight Keys

The illustration shows a device especially designed for removing keys that are tight and inaccessible from the inner side of the pulley, as frequently found on line-shafts, electric motors, etc. The apparatus consists of a U-shaped forged bracket *A* lying close to the shaft, toward the key, and pressing against the boss of the pulley. After



DRAWING A TIGHT KEY

making a "nick" with a cold chisel, as conditions demand, the tongues *B* are placed so as to grip the key by means of the setscrew *C*. Finally, by the aid of a wrench on nut *D*, *A* is forced against the boss of the pulley and the key is drawn out. A 1-in. machine screw with an extra-wide nut will generally answer.—E. Pilpel in *Power*.

The Weak Spoke

By Tom Lowe

A wheel revolved on its axle under a heavy load. Its oak hub and felloes and its hickory spokes had been selected with care, and it was doing its work well.

But one of its spokes, beneath its smooth outer finish, contained a flaw from an old windshake in the parent tree, and as the load came upon it in turn, it felt the strain and grumbled. To this spoke it seemed that its neighbors were shirking, and it lost sight of its own weakness in the imagined weakness of its fellows.

Finally it became warped and loosened from the hub, and the wheel was up for repairs.

A straight-grained piece of timber, less seasoned it is true, was made into a new spoke; and the old one was thrown among the refuse.

With its weakness removed, the old wheel went along with its work faithfully and efficiently.

What kind of a spoke are you?

Successful Colliery Management

By H. M. Crankshaw*

SYNOPSIS—So to manage a colliery or a group of collieries that the owners shall receive continuously good returns on their investment, so that the employees are as nearly satisfied as human beings well can be, and so that maximum efficiency is secured for the present and the future, is no small task. These conditions are closely approximated in a mine where everybody works hard, everybody draws good wages and everybody is happy.

Before discussing the details of successful colliery management, a definition of what this is will help to fix our ideas on something tangible. Successful colliery management might be defined as managing a colliery so that the shareholders receive a good return on their money. To attempt to run a colliery with this as the immediate and only consideration always leads to disaster in the long run, and sometimes the disaster comes quickly.

One of the essentials in colliery management is foresight, ability to think and look ahead, while never losing grip on the present. What will conditions be in three months, six months, a year or five years from now? By bearing the future in mind the engineering work when completed will be well done instead of otherwise.

Further, a colliery to run smoothly must have reasonably satisfied employees. Therefore we might say that successful colliery management consists in running a colliery or a group of collieries so that the shareholders or owners get good returns on the money invested, so that the employees are well treated and are as reasonably satisfied as it is possible for human beings to be, and to so plan the engineering work and equip the operation mechanically that it has a maximum efficiency not only when the plant is first started, but in the more distant and extended future.

To keep a colliery operating on an efficient basis it is just as fatal to spend too much money as to spend too little. Too much money expended means that interest and depreciation charges are high, whereas too little signifies poor and inefficient equipment.

With the foregoing introduction we may proceed to discuss the colliery. The illustrations are taken from the anthracite region, and the individual operator who has an old, almost worked out mine on his hands will have problems to face, each one of which must be worked out on its own merits.

The Essentials of a Breaker

Three essentials are required of a breaker. The first is that the product shall be good merchantable coal. The second is that all the coal dumped into the breaker shall be recovered, the amount going to the waste bank with the refuse being negligible. The third is that in the process of breaking the coal down from run-of-mine to merchantable sizes the percentage of small sizes shall be kept as low as possible. Some breakers are so full of patent devices and mechanical contraptions that the main objects for which the breaker was built are relegated to the background.

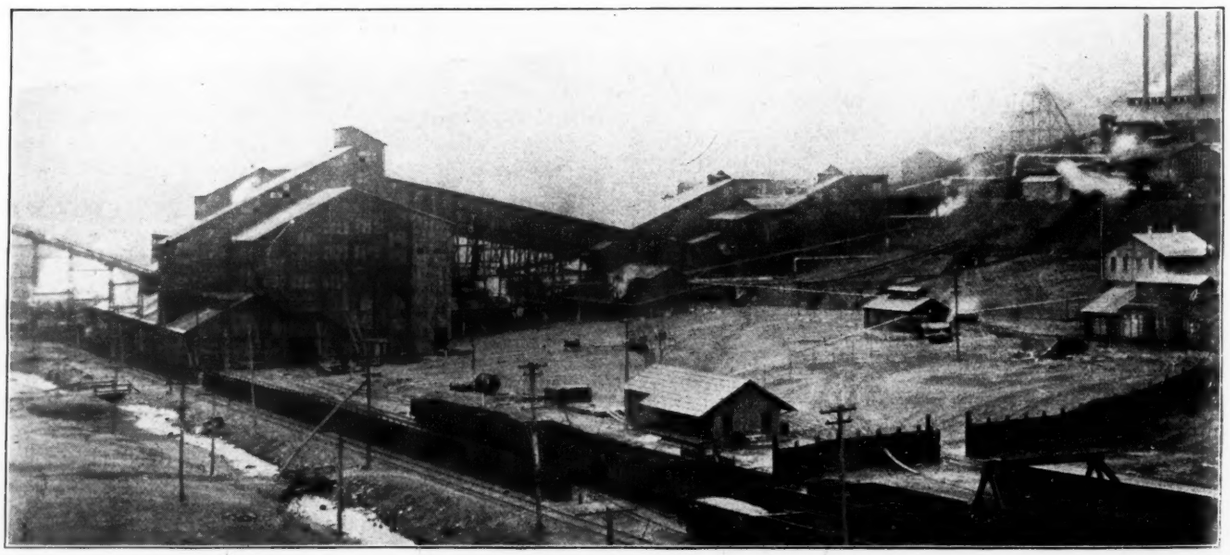


FIG. 1. LANSFORD MILLION-TON-PER-YEAR BREAKER

One of the most successful managers in the anthracite region was asked by the chief draftsman what special features he wished to have in the new breaker. His reply was, "Make it simple, make it straightforward, make it so that I can understand it." There is more truth in this humorous reply than one might think. By all means try any device that might prove an economic benefit, but do not let anything interfere with the simple process of preparing merchantable coal.

Throughout the anthracite region breaker practice must of necessity vary because of the difference in character of the freshly mined coal that must be prepared. Fig. 1 shows a general view of the Lansford twin breaker, which in 1914, when I was district superintendent of this col-

*Manager, Cranberry Division, Lehigh Coal and Navigation Co., Hazleton, Pennsylvania

liery, produced over one million tons of freshly mined coal. In some portions of the southern anthracite field the proportion of refuse sent to the waste banks is over 30 per cent., whereas in parts of the northern anthracite field the refuse is less than 10 per cent. The general principle, however, of handling the coal as little as possible and making the preparation as simple as possible will always apply.

Where large quantities of bank material must be rehandled, it is not generally good practice to run more

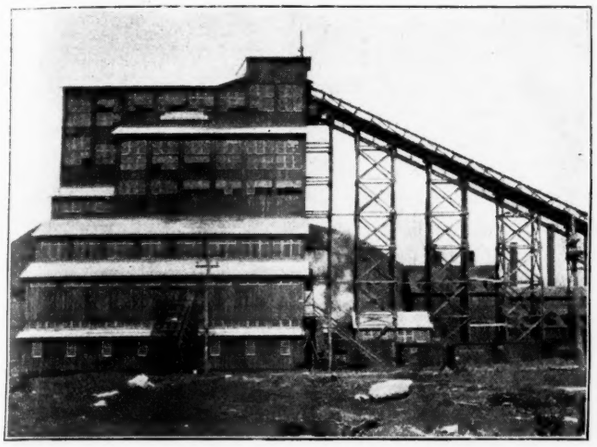


FIG. 2. LATTIMER BREAKER, ONE OF THE BEST IN THE ANTHRACITE REGION

than 15 per cent. of the bank material along with the freshly mined coal, as otherwise the appearance of the fresh coal is made to suffer, with a consequent drop in market value. It is better practice to build a washery and handle the bank material as a separate and distinct washery product.

Good mine cars are necessary for economical operation. A mine car should have reliable, easy running bearings, should seldom be in the shop and should cost a minimum for upkeep. First-class mine cars, operating under favorable conditions, cost 1c. a ton for upkeep. Very poor mine cars cost 7c. a ton for upkeep and cost as much more in delays occasioned by trips off the track, time lost in switching out shop cars, etc., to say nothing of the worry to all concerned.

Mine cars are expensive; consequently, too much study cannot be given to their design and, while it is necessary to think about the bearings, it is still more necessary to study the underframe, as no bearings will stand up without a rigid, well designed underframe.

Outside transportation can only be successful when the power units are equal to the work. Small locomotives, used for heavy traffic, simply occupy the time of a driver and patcher who might be doing some other work efficiently, to say nothing of aggravating the colliery force by jumping the track about the time a big locomotive is due. Two 38-ton locomotives will do the work of four locomotives of a type less than 20 tons weight, where the traffic demands are heavy, thereby effecting a considerable saving.

An engine or a piece of machinery to be satisfactory must first of all be serviceable. A mechanical arrangement which is subject to breakdown is more unreliable than a drunken employee. Therefore no machine should be put to do work for which it is not fitted, as breakdowns are expensive.

Good rolling stock is of little use without good track. Any main haulage road, inside or outside the mines, on which there is heavy traffic, with power units weighing 15 tons or more, should be laid with 60-lb. rails. For mine use second-hand relaying rails can often be obtained which have previously been used on some railroad or have been used and then rerolled. The saving by using good track should be obvious, but it might be explained that good track costs practically nothing for upkeep when the track has once become settled, and wrecks are seldom heard of. With poor tracks, wrecks and delays are frequent. Some wrecks inside the mines which knock down timber and tie up a main haulage-

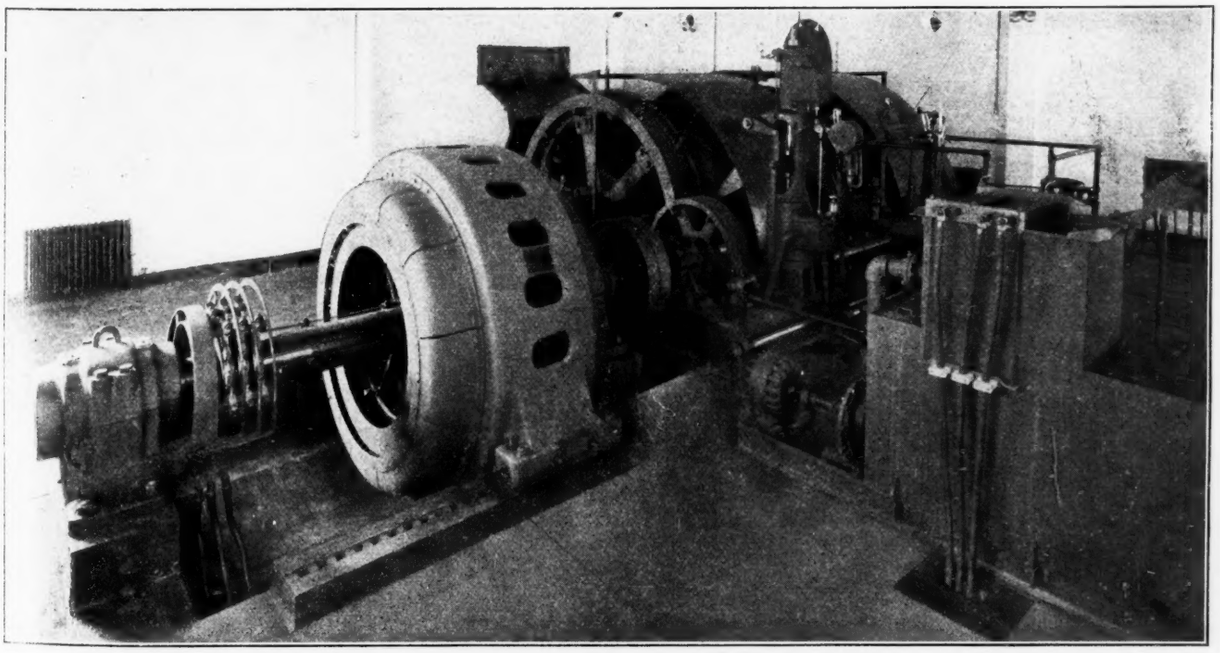


FIG. 3. MODERN ELECTRIC MINE HOIST

way for hours cost enough to buy a carload of rails under normal market conditions.

Finally, we may be sure that the transportation system is good when, as one outside foreman expressed it, "There are loaded cars staring the breaker in the face all day long and empty cars waiting for the mines."

The first requisite of a hoist is that it shall be what might be called a good "pinch hitter." That is to say, if a hoist is required to average 60 cars an hour, it should be able to handle 80. The reason is that when, for one hour, the hoist, due to delays, drops to 40 cars an hour, the average can be maintained by hoisting 80 cars during the next hour.

Electric hoists, Fig. 3, are coming to the fore and for a new installation, or where a new hoist is required, the following facts will help in deciding what to install:

Where the hoist is located near a permanent economical boiler house, a steam hoist, Fig. 4, should be used, as for the same duty a steam hoist costs about half as much as an electric hoist. For example, if 80 cars an hour have to be raised from a depth of 600 ft. and if the loaded cars weigh 5 tons apiece, then a steam hoist costing $20,000 or an electric hoist costing $40,000 would be needed.

When, however, we come to isolated hoists, where it is a question of either running long steam lines or putting up isolated boiler plants, electric hoists are the most economical installation. An electric hoist, on the figures given above, as compared to a steam hoist, would have against it an interest and depreciation charge of 15 per cent. on $20,000 per annum, or $250 a month. This sum, however, is soon lost through long steam lines on a large installation, because of condensation, etc.

One case comes to my mind where a steam line about one mile long supplied steam down a borehole to a small inside hoist and pump. We found, by putting a meter on the steam line, that the steam was costing $400 a month. We had on hand a small 50-hp. electric hoist worth about $2500. This hoist was installed, the water diverted to another pump, and the monthly cost cut down to less than $100, or a saving of over $300 a month, including the cost of pumping the diverted water. These figures were actually proved over a period of several months, since at this operation steam as well as electric power was purchased and paid for on meter readings. Fig. 5 shows a modern substation which will replace a colliery boiler plant.

An economical colliery boiler plant, Fig. 6, must have plenty of grate area and heating surface for the amount of water to be evaporated. If the heating surface is too limited, the boilers must be forced and a rating of over 100 per cent. obtained. This of necessity requires a high grade of fuel with hand-fired boilers. It is not necessarily the quantity but rather the grade of fuel burned that generates expensive steam. To take a practical example, sup-

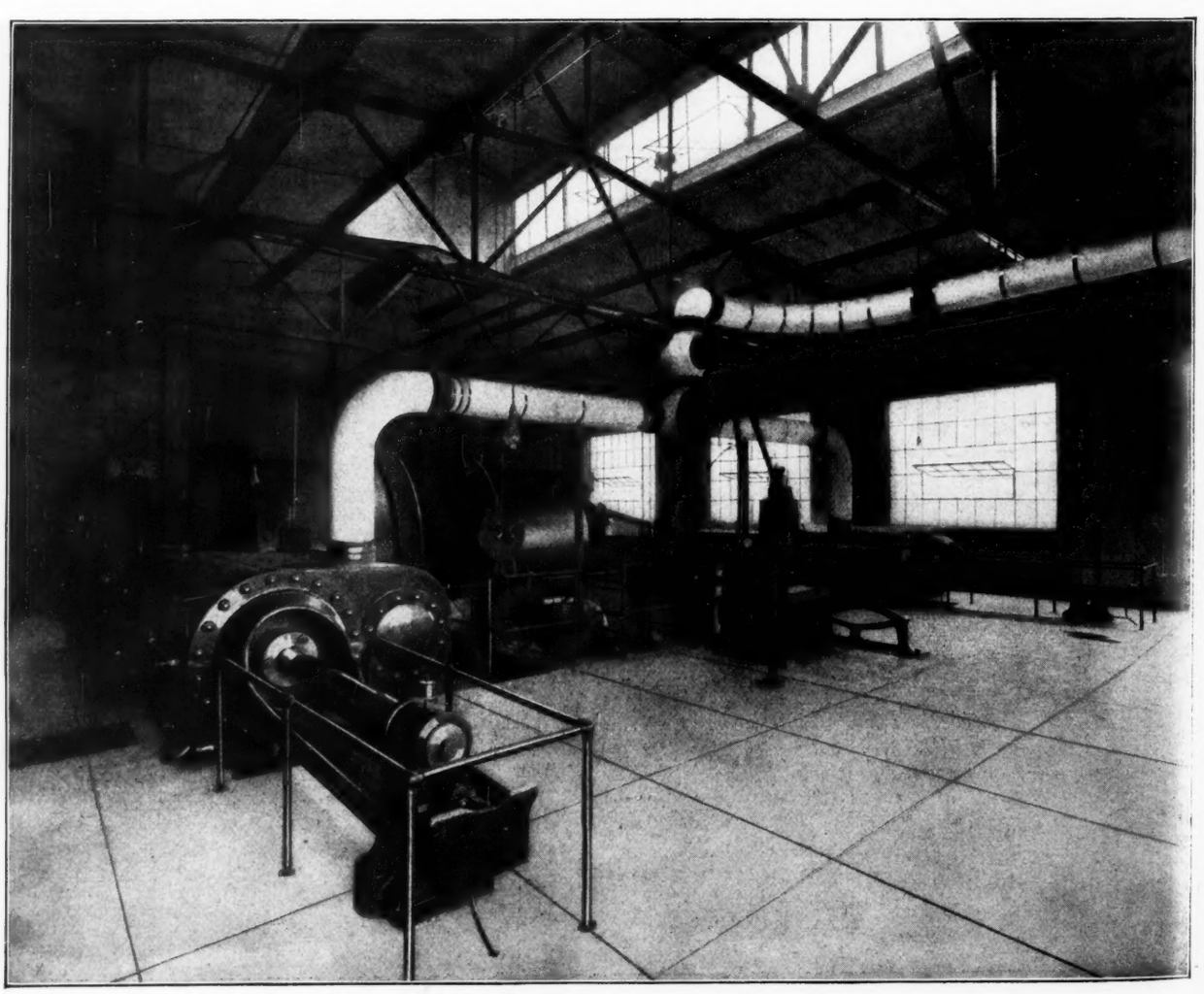


FIG. 4. A MODERN STEAM MINE HOIST

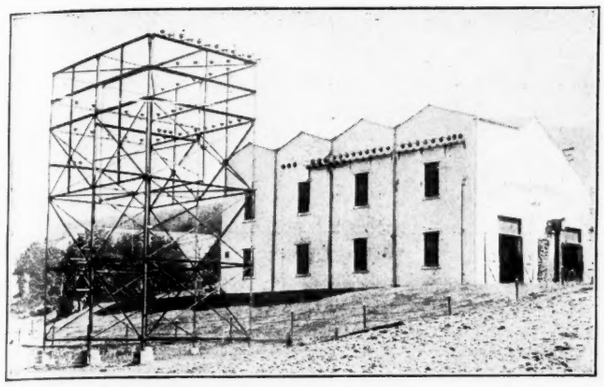


FIG. 5. MODERN COLLIERY SUBSTATION

pose a boiler plant rated at 5000 hp. burns 5000 tons a month of No. 2 buckwheat or rice coal, and needs No. 2 buckwheat in order to generate the necessary steam. The monthly cost of fuel for this plant with No. 2 buckwheat at $1 a ton would be $5000. If, however, two 500-hp. batteries, costing about $12,000, are added to the plant so that the total nominal rating is 6000 hp., the same load could be carried by burning No. 3 buckwheat or barley coal; and even if 6000 tons of barley coal were burned, the value of this fuel, with barley at 50c. a ton, would still only be $3000 a month, as compared with $5000 a month when burning rice coal, or a saving would be made of $2000 a month.

These figures apply to hand firing only; the same result could be obtained by applying traveling grate stokers. Fig. 7, to a portion of the original plant, as practically twice the rating can be obtained from a mechanically fired boiler as compared to a boiler hand fired with the same fuel. The success of mechanical stokers depends upon the use of a uniform fuel which should not contain over 8 per cent. moisture.

The cost of applying a mechanical stoker to a 500-hp. boiler with a single grate is about $3500. The upkeep of stoker grates is 100 per cent. more than that of grates on hand-fired boilers, but in a large boiler room where, under hand-firing conditions, 60 men would be needed, if the boilers were all stokered, only 20 men would be needed, and the rating of the boilers would be doubled.

The key to successful mining is to get the development work and the robbing to balance. This is especially important in the southern anthracite field, where development consists largely in driving rock tunnels and unproductive gangways. If a mine is continually struggling along with the development work always behind, the tonnage is never what it should be, and many other abuses crop up which are very expensive. For example, pillars are robbed before they should be robbed, refuse that should be left in the mine is loaded out with the coal, the car yield drops off and, due to the premature extraction of pillars, the percentage of recovery is low. To have the development work of a mine behind is therefore poor policy.

On the other hand, if the development work is too far ahead, money has been spent which is not giving any return.

Of all mining operations the most wasteful and useless is timbering, and where the cost of timber and timbering is over 20c. a ton, it is obvious that the mine must stand the continuous drain of a large sum of money. Enough timber must at all times be used to keep the gang-

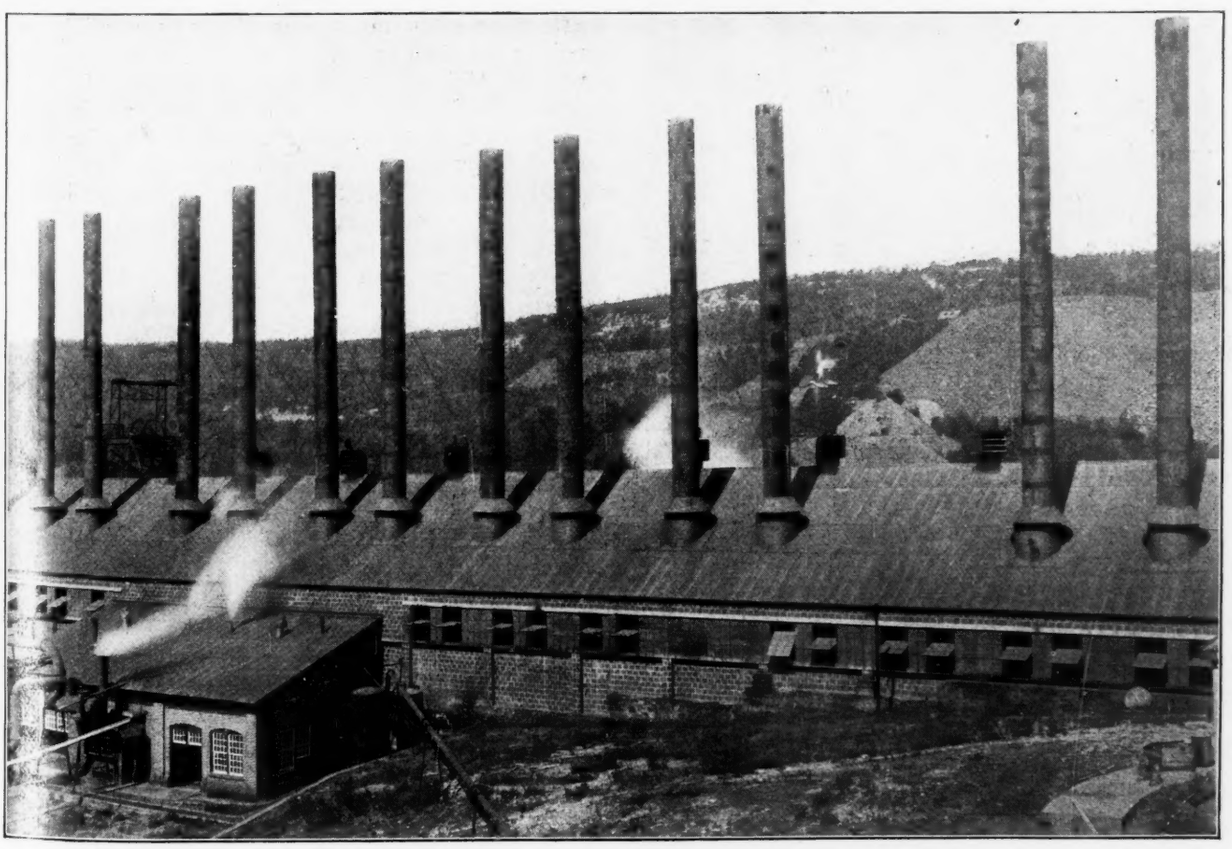


FIG. 6. LANSFORD COLLIERY BOILER PLANT OF FIREPROOF CONSTRUCTION

ways and traveling ways in the mine safe and to protect the miner generally. It is essential, however, always to remember that timber should be used for local support only; it cannot support the pressure of a large mass of overburden. This can only be properly and economically taken care of by following scientific mining methods.

It therefore becomes apparent that the method of working a colliery should be subjected to the strictest supervision and should be carried out in a consistent scientific manner. One of the excuses sometimes given for not working in a workmanlike manner is economy. It is, however, decidedly blind economy to imagine that by pulling a mine for a month or two in order to make a temporary cheap cost anything but destruction is being done. It is the equivalent of running a willing horse up hill until his heart is broken, as not only must the temporary cheap cost be paid for in the near future, but the possibility of establishing a consistently cheap cost is destroyed.

The expensive work in the actual mining of the coal is the advance work, the cheapest coal being obtained from mining the pillars. Since the pillar coal in the vast majority of cases is the cheapest, it is obvious that as much of the pillar coal as possible should be recovered; hence

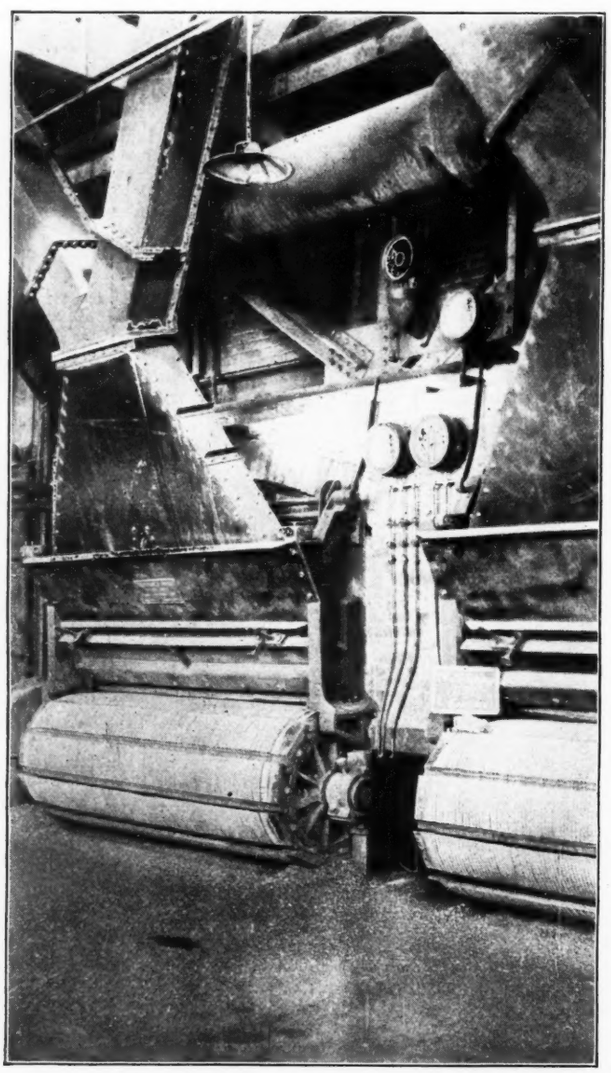


FIG. 7. CHAIN GRATE STOKERS

the value of a good recovery and a high percentage of extraction. Once the economic value of a good recovery is seen, apart altogether from the question of conservation, a 90 per cent. recovery or better should be systematically striven for.

In the majority of cases the cry of bad top and heaving bottom is due to unscientific methods of mining

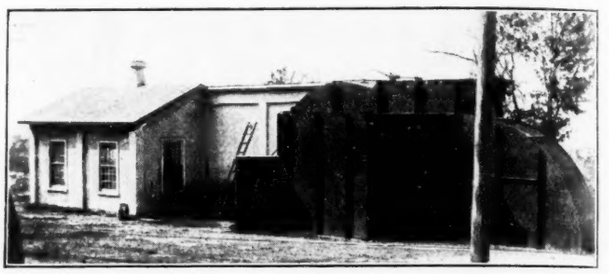


FIG. 8. ELECTRICALLY DRIVEN REVERSIBLE MINE FAN

which allow the pressure to come on pillars insufficient to stand the weight. It is well to bear in mind the old Arabic proverb which says, "It is not the trouble which God sends, but the troubles we bring upon ourselves which cause our undoing."

The problems of ventilation are decidedly different in different mines. In pitching anthracite operations the hardest problem is the ventilation of the pitching places. In bituminous mines the hardest problem is the efficient ventilation of the mine so that the danger of a dust explosion is reduced to a minimum. One of the chief factors governing efficient ventilation is the distance the air must travel, it being understood in all cases that the area of the airways is ample.

After the air has traveled one mile, we are rapidly approaching the limit for efficiency. Two miles is too far for the air to travel unless there are exceptional conditions such as deep shafts sunk to flat beds, which make the cost of additional openings prohibitive. Under ordinary conditions enough openings to the surface are highly necessary, so that the velocity of the air need not be too high at the fan nor the return air too foul; also the upkeep of long return airways is high.

There has often been a great deal of vexatious argument as to the respective merits of exhaust fans and force fans, Fig. 8, when as a matter of fact local conditions must govern the choice between the two types. When a property is spread over a wide area and it is possible to drive airways to the surface where necessary, several fans should be installed, the air from each serving such an area as gives the best economic result.

In studying the problems met with in order to so establish the ventilation that good air will be circulating in every working place in the mine, it must be remembered that only by supplying every man with good air can we obtain the maximum efficiency from each worker. This brings us to efficient methods of working.

The most efficient method of mining coal known to me is a longwall face in a bituminous coal mine which is undercut by a mining machine every night. The machine is followed up by men who drill the coal. These in turn are followed by shotfirers who shoot the coal down, ready for the loaders to load out next day. This process is repeated daily. Everybody is on contract, everybody makes good money, everybody works hard and everybody is happy. Yet, withal, this system is the very

essence of concentration; no ground is kept open which is not required, and a large tonnage is secured from a small area.

No one likes to talk about the worst system he ever saw, but I once heard of a miner who buggied his coal three times before loading it into a car and then carried timber 600 ft. up the pitch to his working place. (The Singer Tower in New York is about 600 ft. high.)

We can see therefore the necessity of arranging, systematizing and organizing from the surface to every miner's working place. If, then, the strictest supervision is not given daily, it will still be impossible to keep the army of inside employees efficiently employed.

Pumping and hoisting water reminds me of a very human story. There was a wreck in the water shaft; after 24 hours' work the tanks were going again. A second wreck occurred which took two days to clean up, and the mine was drowned out. The manager appeared soon after the tanks started to run the second time and announced he was tired of wrecks, and that if any more happened he would fire everybody—inside foreman, outside foreman, hoisting engineers, top man, everybody. When the manager had walked about 200 yd. away from the shaft a third wreck occurred. He walked back to the shaft, looked around at everybody, and said, "Well, folks, what are you going to do now?" And the outside foreman, who had been working for three days and nights, is said to have smiled.

The first essential, therefore, of a plant for handling water is reliability. During the past few years large capacity, electrically driven, multistage centrifugal pumps, Fig. 9, have rapidly been coming into general use. The reliability of this type of pump has been established. The quantity of water delivered does not depend upon a steam pressure which is likely to vary, and the efficiency is high.

A practical example is a large steam pumping plant, capacity 5000 gal. a minute, supplied with steam from an efficient boiler plant situated 2000 ft. from the pumps. If the steam pumps are replaced by electrical equipment, the saving in the cost of power would be about 25 per cent.

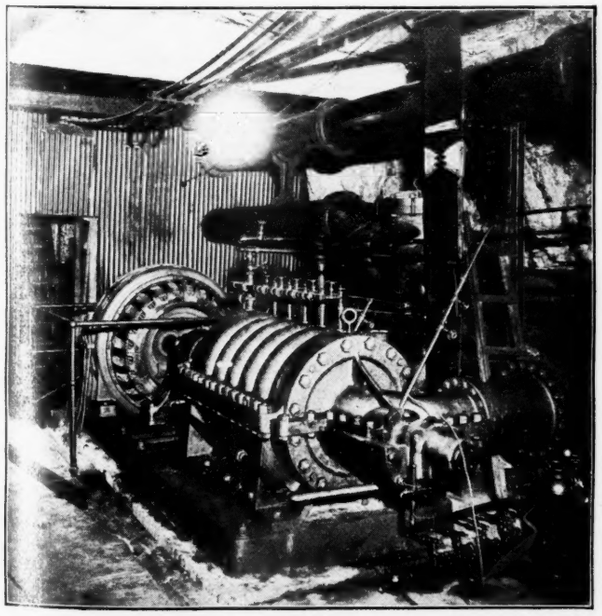


FIG. 9. UNDERGROUND PUMPING STATION

If the boiler plant and steam lines are in poor condition, this saving increases, and in addition there is considerable saving in maintenance, due to the fact that steam-pipe holes are expensive to maintain. The 25 per cent. saving would amount to about $500 a month and the cost of replacing steam pumps by electric pumps would be about $20,000. This figure will vary with the head. By adding in the decrease in maintenance charges, the change would pay for itself in three years' time.

If a steam pumping plant is a first-class installation in every way, operating under favorable conditions, in all probability it should not be touched. If a steam pumping plant is in fair condition, it should be figured on. But if a steam pumping plant is such as is too often found around collieries, immediate action will save a lot of money. When new equipment is being considered, the figures will reveal much in favor of an electrical installation.

The simplest and cheapest inside transportation in the world is to be found in mines where the cars are loaded directly from chutes and hauled by a single motor to the bottom of the shaft or slope. The most difficult is to be found where the beds are thin and folded, the pitch of the folds being less than sheet-iron pitch.

This latter condition has, in some cases, led to an extraordinary amount of handling and rehandling, which has multiplied the cost. Therefore, in inside transportation, after seeing that the main tracks are in good condition, that the tracks are kept true and that the main haulage units are efficient, every effort should be directed toward reducing the number of times a car is handled. Once a car is loaded it should be on its way out of the mine and an empty car put in its place. Nothing costs more than to have miners short of cars.

Costs Are Comparative

Mining costs the world over are only an approximation. If a mine, like a wheat field, was out in the open so that everybody could see just exactly what was going on, it would be easy to understand. Everybody realizes that to keep up good crops fertilizer must be used, yet to get some people to understand that in order to keep up a good production development work must be done consistently, is often a task. A mine may show a cost one year of 10c. less than the year before. Yet viewing the two years together with respect to the present and future earning power of the property, the year with the higher cost might be much the better period. It is this fact which makes the relative value of cost figures difficult to appraise correctly.

A good cost can best be obtained and maintained by letting all the officials know to what end they are working, thus getting the benefit of everybody's brains. The total overall cost is the important figure, the various subdivisions being useful only to show where the money is going and exactly which costs are high.

Many of us have heard of the manager who severely reprimanded his subordinates because the cost of timbering was high. The next month the total cost was just the same, but the cost of timbering was lower, because some of the cost of timbering had been switched over into other items. Thus no useful purpose was served and much valuable time was lost in fixing up the time books to appease the boss. Human nature does not like blame, and if a man is continually censured for every little mishap, he will end by telling his boss as little as possible.

Get everybody thinking, keep everybody thinking, utilize the thoughts of others as much as possible and help a subordinate out with a suggestion once in a while. All criticism to the contrary notwithstanding, most foremen take a pride in their mine and try to do the best according to their knowledge. Mistakes and troubles are due as often to ignorance as to any other cause. Therefore when everybody is thinking and pulling together, and only then, will the proper cost be obtained.

Selling coal in normal times is largely a matter of mutual confidence. If a shipper sends inferior coal to a merchant and maintains that the coal is good, he will never sell coal to that merchant again. If a shipper sends inferior coal to a merchant and admits that it is inferior, paying the penalty for the poor grade, he may keep that merchant's orders. But if a shipper sends good merchantable coal at all times, he will still occasionally run against someone who will try to beat him, but he need never be beaten twice by the same man. Further, he will establish a trade which will stand up under competition and yield him a fair price. There is perhaps as much human nature in selling coal as in anything under the sun, and the principle to be remembered is that trade to be satisfactory must be mutually beneficial.

Use of Mine Water as Boiler Feed

By Edwin M. Chance*

SYNOPSIS—Except in case of dire necessity, acidulous mine water should not be used for boiler feeding. Neutralization with lime in a typical case allayed corrosion but augmented incrustation. A double neutralization, first with lime and then with soda ash, stopped both corrosion and scaling but caused the boilers to foam badly. This was checked by frequently blowing off.

Some years ago an unusually severe dry spell threatened to cause the majority of the collieries in the southern anthracite field to suspend operations. This drought occurred in the fall of the year, and as the water companies supplying this region drew their supply for the most part from reservoirs fed by surface water, and as these reservoirs, due to the shrinkage in their supply, were well nigh dry, the situation was extremely serious.

The company with which I was connected at that time made every effort to meet the emergency by installing small pumping stations on streams within a radius of about 10 miles of its mines, and hauling water in tank cars for its boilers. The supply thus secured proved entirely inadequate, so other means for maintaining a supply had to be resorted to, if the mines were to be operated or even keep free of water.

Single Neutralization of Mine Water Was Not Entirely Satisfactory

Under similar conditions the practice in the past had been to attempt to purify the mine water for use as boiler feed by neutralizing its acidity with slaked lime, and for this purpose each boiler plant was equipped with one or two treating tanks of about 10,000 gal. capacity, and from six to eight settling tanks of about 5000 gal. each. The results with this method of treating mine water had been most unsatisfactory as the effect upon the boilers of this treated water was decidedly unfortunate. As a matter of fact, the use of lime tended to lessen the corrosive effect of the raw mine water but, on the other hand, increased, if anything, its scale-forming proclivities.

Because of the high acidity of the waters to be treated, and the great weight of incrusting solids to be removed, it was obvious that only the cheapest of chemicals could be used, were the cost of the treatment to be kept within reasonable limits. The following typical analysis will illustrate this point, if the fact be kept in mind that the mean daily consumption of boiler water per colliery was in the neighborhood of 120,000 gal., and over 20 collieries were short of water.

TYPICAL ANALYSIS OF ANTHRACITE MINE WATER

Appearance, yellow turbid.	Parts per Million
Free sulphuric acid, H_2SO_4 (to methyl orange)	160
Total acidity, H_2SO_4 (to phenol phthalein)	1,200
Oxides of iron and aluminum (Fe — Al)$_2O_3$	500
Lime, CaO	200
Magnesia, Mg	200
Total sulphuric acid, SO_3 (gravimetric)	1,500
Total solids	3,000

It should be remembered that the water, the analysis of which is given above, is only moderately acid, many waters being ten times as polluted as this.

Were this water treated with slacked lime its acidity would be destroyed, its iron and alumina, and about half its magnesia, would be removed. Its lime content, however, would be increased to about 800 parts per million, and such lime would exist entirely as calcium sulphate. Such a water would be so frightfully incrusting as to quickly ruin the boilers in which it was used.

Both Slacked Lime and Soda Ash Employed

After a careful consideration of the urgency of the case and the means at hand, it was decided to destroy the acidity of the waters to be treated by the use of slacked lime, and then to precipitate as much of the calcium sulphate as possible by the use of soda ash (crude dry sodium carbonate).

In carrying out this process the water was pumped to one of the large treating tanks and there heated to as high a temperature as possible by exhaust steam from the breaker engine or any other prime movers in the vicinity. As a general rule there was no difficulty in heating the water to a temperature of 65 deg C. (150 deg. F.). In some cases it was found advisable to use some live steam with the exhaust, as a slight increase in the temperature of the water greatly increases the rapidity, efficiency and completeness of the treatment. After the water has reached the desired temperature, slacked lime was run into the tank, the contents of which were stirred vigorously, until a sample of the water gave a pronounced and permanent pink color when a few drops of phenolphthalein solution were added to it.

It is to be noted that the addition of the slacked lime causes a voluminous precipitate of the hydroxides of iron and aluminum, and that when the point of complete neutralization is approached this precipitate begins to settle rapidly, leaving a foot or so of perfectly clear water

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at the top of the tank. This appearance is characteristic and permits the man in charge of the treatment to judge, with fair accuracy, when sufficient slacked lime has been added. Thus it is only necessary to test the water with phenolphthalein at the very end of the treatment, so that the end point shall not be passed.

After the slacked lime has all been added, the calculated weight of soda ash, dissolved in water, is run into the now slightly alkaline water. The whole is again agitated and then run into the settling tanks, which are at a lower level than the treating tanks. The softened water is then allowed to stand until thoroughly settled, generally a matter of 3 or 4 hr., when it is run to the boiler-feed tank. In order to run the water away from the settling tanks without disturbing the sludge, a pipe about 3 in. in diameter is used, running from the bottom of the settling tank to the surface of the water. This is so hinged at its lower end that its upper end may be lowered as the level of the water falls. In this way the surface water is drawn away gradually, and the level of water in the tanks is lowered without disturbing the sludge in their bottoms. When the settled water has been run away a plug is removed from the bottom of the tank, and the sludge is washed out by a stream of water from a hose, finishing with a broom, if necessary.

By using two treating tanks, softening water in one while the other is filling, and carrying the softened water to any desired settling tank by means of troughs, the capacity of the plant is greatly increased and the man in charge of the treatment is kept busy continuously. It was found that the ordinary labor about the colliery could be used for this work provided intelligent personal instruction was given to begin with.

Water Foamed Badly Yet Could Be Used

While this method of treatment was by no means perfect, still the results obtained were sufficiently satisfactory to permit the collieries to continue in operation. The cost of this treatment for chemicals alone was in the neighborhood of 20c. per 1000 gal. of water treated.

In order to show the degree of purification secured, the following analysis of treated water may be quoted. This water in the raw state had the composition shown in the analysis given above.

ANALYSIS OF WATER SOFTENED BY THE USE OF LIME AND SODA

Appearance, clear and colorless.	Parts per Million
Alkalinity (as sodium hydroxide, NaOH)	5
Alkalinity (as sodium carbonate, Na_2CO_3)	40
Oxides of iron and aluminum (Fe — Al)$_2O_3$	None
Lime, CaO	40
Magnesia, MgO	40
Total sulphuric acid, SO_3 (gravimetric)	1,300
Total solids	2,500

It is to be noted that the treatment was slightly in excess of the demands of the water in question, as the treated water contained some caustic soda and sodium carbonate. This was found to be desirable, as these bodies will attack the lime and magnesia remaining in the water when the latter is heated in the feed-water heaters, precipitating them before they reach the boilers.

It is to be noted also that the total solids of the water have not been greatly reduced. This is due to the fact that practically all the sulphuric acid of the raw water remains in the treated water as sodium sulphate. The presence of this large amount of sodium sulphate in the treated water is one of the chief disadvantages of this method of treatment, as it prevents the complete precipitation of lime and magnesia, and the accumulation of concentrated solutions of this salt in the boilers causes them to foam badly. Indeed it has been found necessary to blow off the boilers every hour in some cases in order that foaming may be minimized. This foaming is aggravated by the fact that the average colliery boiler plant is far too small for the demands put upon it. Being constantly overloaded, any tendency toward foaming is increased.

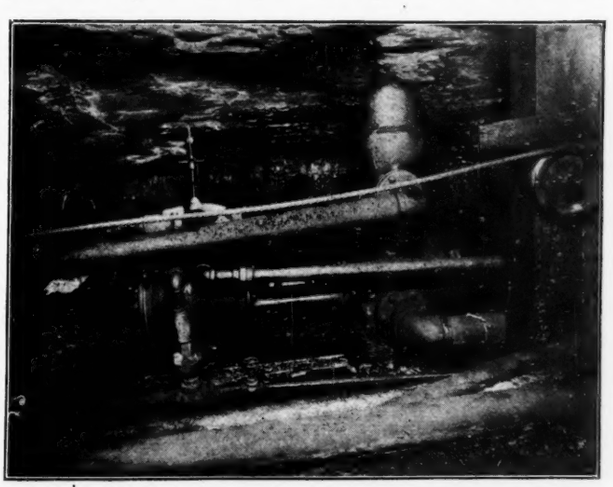
Another interesting feature developed by this work was the tendency this softened water displayed to loosen and dissolve old scale. This tendency was so pronounced in some cases that cracks and pinholes in the boiler tubes and shells, which previously had been stopped by scale, became evident and led at first to the belief that the treated water was corroding the boilers. Upon repairing the faulty tubes and stopping the leaks, however, this difficulty disappeared and the boilers were all the better for their drastic cleansing.

I have carried out many experiments in the laboratory looking toward the use of barium hydroxide for the neutralization of acid mine waters. The advantage of this softener lies in the fact that with its use the sulphuric acid of the water is precipitated with the iron, alumina and magnesia as barium sulphate, and that if sodium carbonate, or better still trisodium phosphate, is then used to remove the lime, a softened water is obtained that is practically free from incrusting material and, moreover, does not contain notable proportions of sodium sulphate. The difficulty in the way of the application of this treatment is its cost. Still I believe that under many conditions this cost need not be considered to be excessive in view of the advantages to be gained by the use of this method of softening.

It is to be understood that I do not recommend the softening of mine water under normal conditions. Normally the purest available water should be secured for boiler-feed purposes. In time of stress, however, it is useful to know that mine water can be softened if necessary and that a boiler plant may be run on this softened water without damage. In the case quoted above treating the water made possible the operation of several collieries when many neighboring plants had to shut down.

A Successful Mine Pump

The view hereunder shows a No. 9 Cameron piston pump lifting 250 gal. per min. against an 80-ft. head.



This machine, owned by the Victor Coal Co., Holsopple, Penn., has already been in operation for 10 years.

Successful Electrical Installations

By C. L. Packard*

SYNOPSIS—The past few months have witnessed many advances in electrical practice in and about the mines and coal-handling plants. Among the most interesting of these is an 8-cu.yd. electric stripping shovel which may be operated entirely by one man.

During recent months, the General Electric Co. has made many notable contributions toward the efficient and economical mining of coal. These include installations for the generation, transmission and application of electricity as light, heat, power and as a means of transportation. In this latter field, a number of different types of electric locomotives have been designed especially for mine use and are now in successful operation.

One special type, known as a "pusher" locomotive, was designed for handling coal trains and "spotting" cars at the plant of the Toledo Furnace Co., Toledo, Ohio. It is provided with two 125-hp., 250-volt driving motors and has G-E Type M control with straight air brakes.

This locomotive is used for shuttle service on a single line of 42-in.-gage track, centrally located between two lines of standard-gage track on which the coal cars run. Current is supplied by two rails located between the running rails.

At the center of each side of the locomotive is a hinged heavy metal arm or wing pusher. These arms are raised and lowered pneumatically. The locomotive was put in service in July, 1916, and has proved quite efficient.

For yard switching and industrial railway haulage, a compact 12-ton gasoline-electric locomotive was built, to run on standard-gage tracks. Its power plant consists of a 25-kw., 560-r.p.m. gasoline-electric generating set which supplies current at 250 volts to two 25-hp. driving motors. Like the large gasoline-electric passenger cars, its operating speeds are regulated by field control of the generator, and hand brakes are used. It has proved successful in a wide variety of haulage service, and as it is altogether self-contained with regard to its energy supply, it is especially useful where feeder wires or other electrical conductors would be objectionable, as well as for conditions involving long hauls and continuous service, which might limit the usefulness of storage-battery locomotives.

The entire weight is carried on the four driving wheels, and speeds up to 16 miles an hour are obtainable on level track. Its over-all dimensions are notably small, the length being 16 ft., width 6 ft. 6 in., and the height from the rails to top of cab 10 ft. 3 in.

*Schenectady, N. Y.

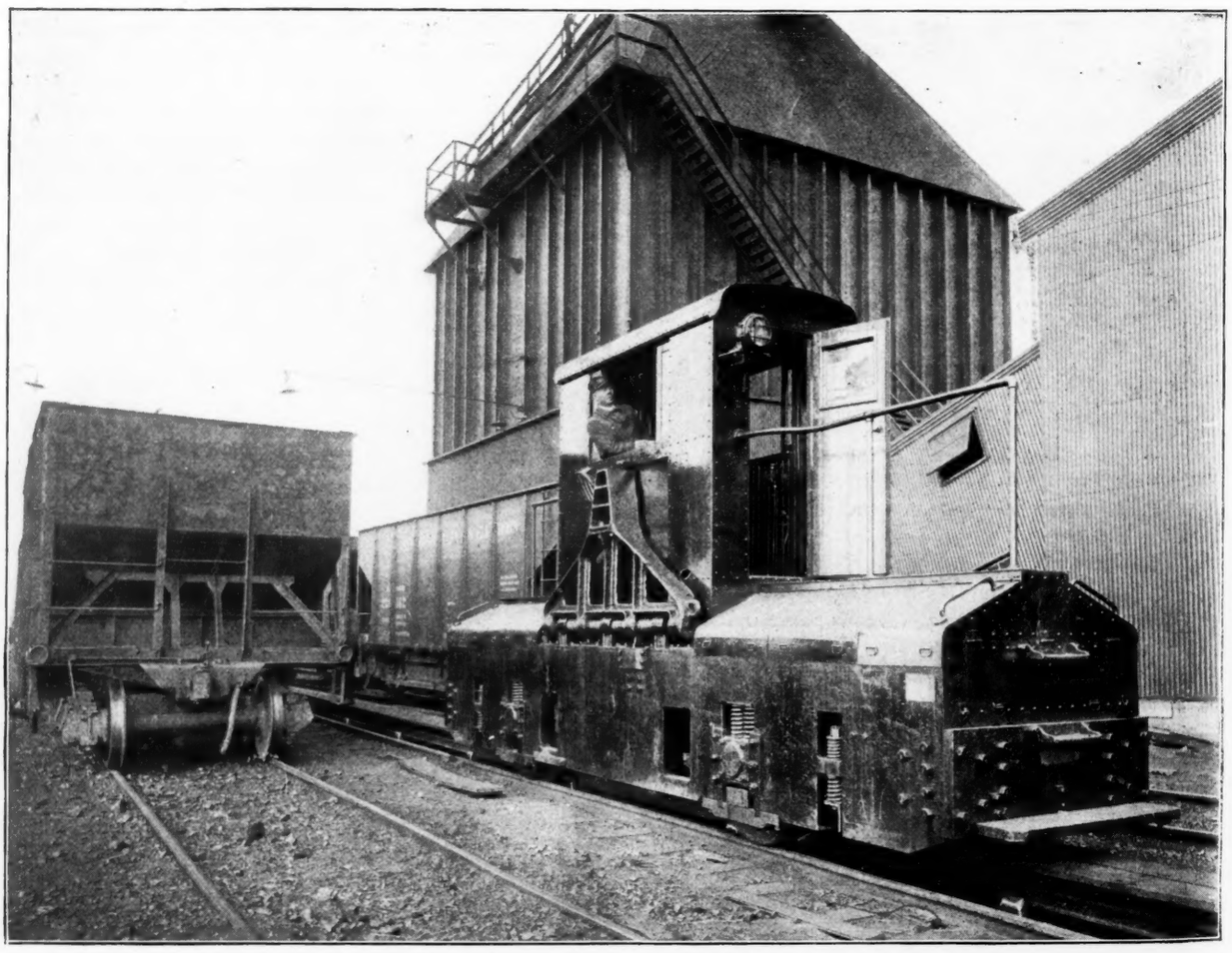


FIG. 1. PUSHER LOCOMOTIVE USED IN SWITCHING YARD

Advances made in the storage-battery type of locomotive were typified by the construction of a double-truck locomotive with the batteries on a centrally located platform joining the two trucks. This minimizes the vertical dimensions and permits effective application for service in low coal measures and on the short-radius curves frequently encountered in mines.

With a total weight of 8 tons, about 6 tons are imposed on the two pairs of driving wheels at either end of the

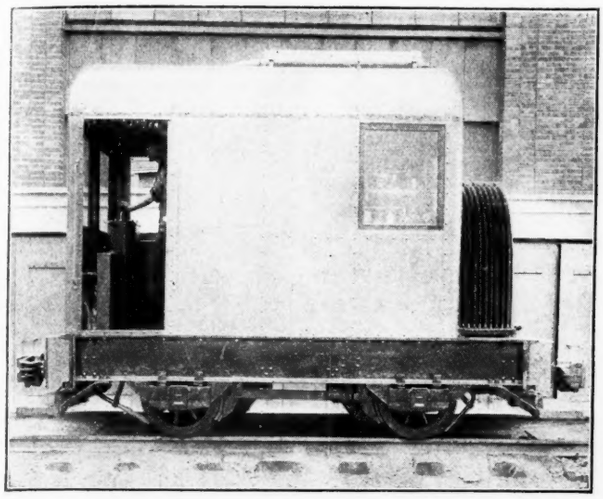


FIG. 2. EXTERIOR OF GASOLINE-ELECTRIC SWITCHING LOCOMOTIVE

locomotive. The two central pairs of wheels are not drivers. Each truck has a rigid wheelbase of only 30 in., while the over-all height above the rails is 34 in., giving unusual compactness and flexibility. As a result of its successful operation others of the same type were ordered.

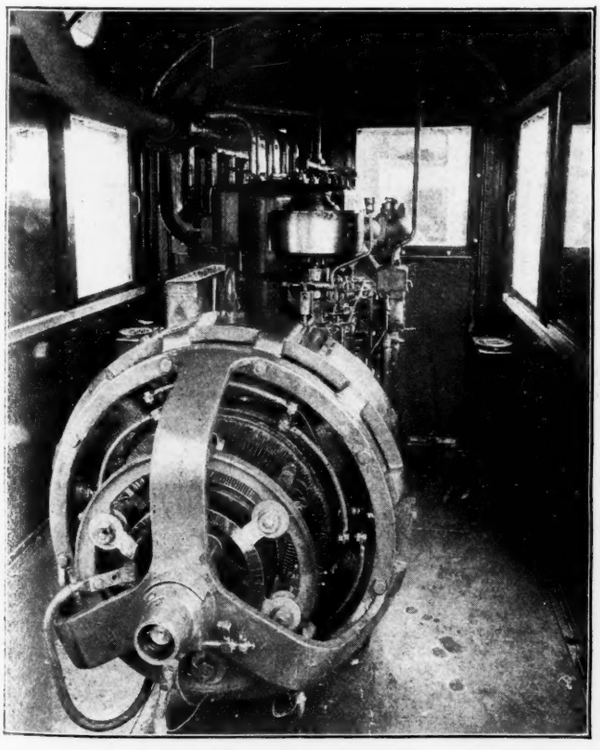


FIG. 3. INTERIOR OF GASOLINE-ELECTRIC SWITCHING LOCOMOTIVE

Toward the end of the year the largest G-E locomotive so far built for general mine haulage was completed. It is rated at 25 tons, but its three 125-hp., 500-volt G-E motors have ample capacity to permit the addition of sufficient weight to give a rating of 35 tons if desired. Its over-all dimensions are: Length over bumpers, 25 ft.; width, 6 ft. 5 in.; maximum height above rails, 54 in. The wheelbase is 120 in.; the machine is provided with 36-in. wheels. The gage is 48 in. and a drawbar pull of 10,000 lb. is obtained at 8.8 miles an hour.

Both straight air and hand brakes are provided. It is also equipped with Type M multiple unit control. Where additional haulage capacity is required the design permits two of these units to be coupled together, so that if necessary the effective rating of the tandem locomotive thus

FIG. 4. ELECTRIC 250-TON SHOVEL

obtainable is raised to 70 tons. This unit was designed for the H. C. Frick Coke Co., at Maxwell Station, Fayette County, Pennsylvania.

In the districts where power shovel operation is practicable for stripping overburden, electric shovels of constantly increasing sizes have been put in operation. A specific case is given in the following description of shovels used in Ohio.

In the fall of 1915 the Piney Fork Coal Co., Smithfield, Ohio, placed in service a 250-ton electric shovel. A year later a similar machine, rated at 300 tons, was installed by the Beech Flats Coal Co. at Rush Run, Ohio. Both shovels strip overburden from coal beds and are the largest electric shovels in existence. The motors and controlling devices on these shovels were furnished by the General Electric Company.

To gain a comprehensive idea of the improvements embodied in the operation and control systems of the 1916 shovel, a comparison of the equipment of both shovels is necessary.

The 1915 machine has a 6-cu.yd. dipper and is equipped with a 300-kw., 250-volt synchronous motor-generator set having a 4000-volt, 60-cycle motor, switchboard control panel, two 170-hp. hoisting motors, one 63-hp. swinging motor, one 60-hp. crowding motor, and three contactor control panels. The motors are of series mill-type construction. The control is automatic and reversible with current limit acceleration, "notching back" and plugging features.

The hoisting control, although not strictly of the reversible type, has a hoisting and lowering position cor-

responding to the forward and reverse positions on any reversible controller. The lowering position is utilized for regeneration, and the energy given up by the falling dipper is applied in the operation of the swinging motor on its return trip.

Magnetically operated air valves are used in conjunction with each control for releasing the friction band brakes. The air is supplied by a small self-contained motor-driven compressor. This shovel requires two men for its operation. At the time of its installation it was not only the largest electrically equipped shovel, but it embodied certain features hitherto untried on this type of machine. The 1916 shovel is not only of greater capacity than its prototype, but its unique control system permits the carrying on of all operations by one man.

The dipper of the new shovel is of 8-cu.yd. capacity, and the operator controls the entire equipment.

The hoisting master controller is manipulated with one hand, and the crowding master controller with the other, while the swinging motor is started and stopped by means of two foot-operated push buttons. The dipper trip, instead of being manually operated, as in the 1915 machine, is opened and closed by a small motor, controlled through a push button in the handle of the crowding master controller.

In other details the electrical equipment of the two shovels is identical. The power is supplied in both cases from a three-phase, 60-cycle high potential line from which the current is stepped down to 4000 volts in the field in which the shovel is operating, after which it is transmitted directly to the shovel through a three-phase armored cable and taken into the cab through a three-ring collector. Slack cable is wound upon a large reel mounted on the shovel frame.

The exceptional size and service capacity of the 1916 shovel may be realized from the following data:

Radius of cut at bottom, approximately 60 ft.
Center of rotation to center of dump, approximately 95 ft.
Height of dump above rail, 65 ft.
Maximum radius of cut, 103 ft.
Length of boom, approximately 90 ft.
Length of dipper handle, approximately 45 ft.
Weight of dipper and handle, 45,000 lb.
Average duration of cycle, 45 sec.

As an evidence that these machines have fully met the service test in a class of work which imposes the severest stresses and jars on the operating mechanism, a third shovel, of the "one-man" type, similar to the 1916 machine already described, has been ordered with the same make of apparatus and control.

Considerable progress was made in the application of electric drive to mine hoists during the year, as indicated by the fact that in that period there were installed 79 equipments, aggregating more than 30,000 hp. The average unit size was about 380 hp. This does not include any hoisting set rated at less than 100 hp. Of this total approximately 24,000 hp., or about 80 per cent. of the rated capacity, consisted of induction motors, the remainder utilizing direct-current equipments with flywheel motor-generator sets and the Ward Leonard system of control.

Although the following installation is used at an iron mine, this method is applicable to coal mines.

About the middle of the year an induction motor-driven mine hoist was put in service by the Tennessee Coal and Iron Co. at Slope 4, Muscoda, Ala. This in-

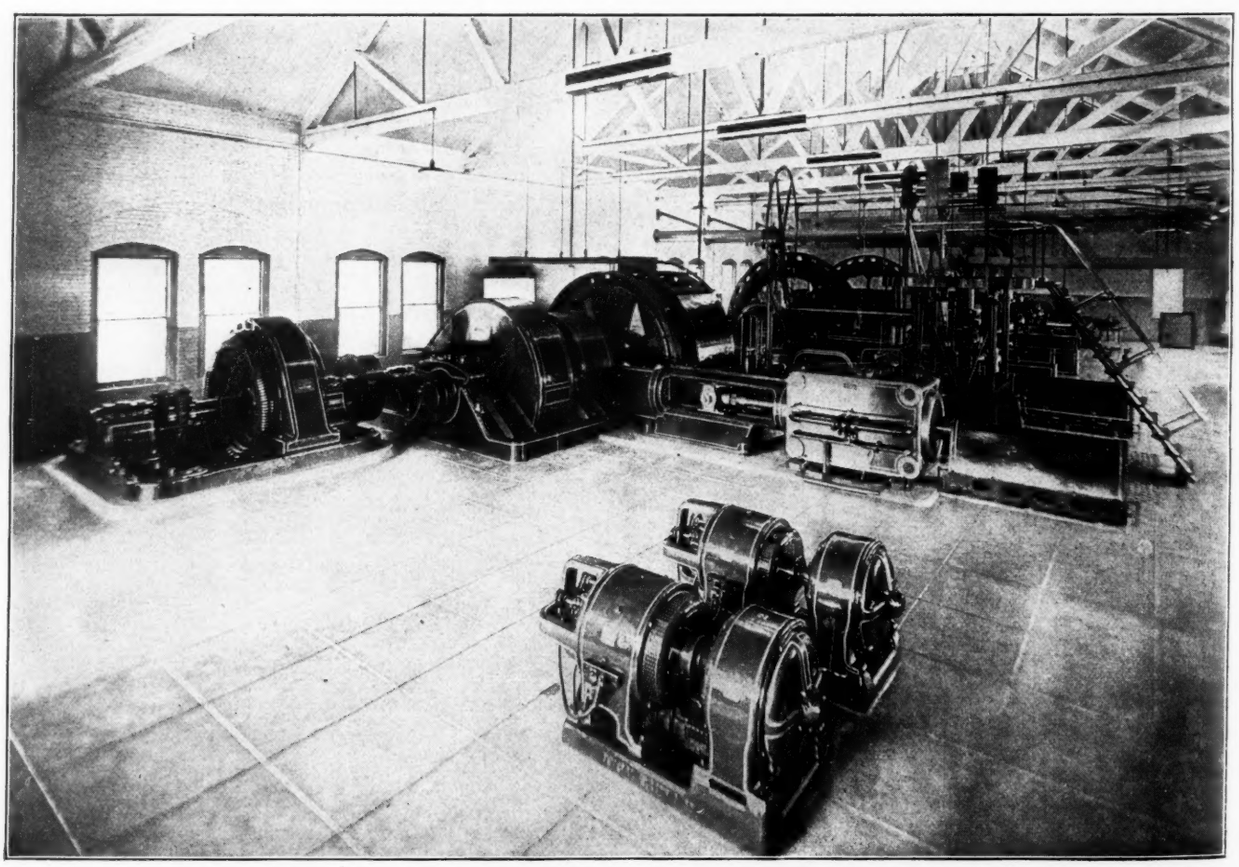


FIG. 5. AN 1800-HP. MOTOR DRIVING A CONVERTED MINE HOIST

cluded an 1800-hp. form M induction motor geared to a single-drum hoist through single reduction gearing. The outfit is the largest induction motor-driven mine hoist ever installed in America. Control is secured through primary reversing air break contactors with liquid rheostat for secondary control, the primary voltage being 2200.

This equipment superseded a steam-driven hoist, and the drums of the original equipment have been retained. It is utilized for hoisting iron ore on a 23-deg. slope, one mile in length, with a load of 26,880 lb. a trip, and with a rope speed of 2700 ft. a minute. The operating results obtained have been so satisfactory that a number of similar equipments are being considered for other properties of the same company.

Another outfit having the same system of control has been applied in the operation of a water hoist at Lansford, Penn., by the Lehigh Coal and Navigation Co. The induction motor in this case is rated at 1200 hp.; it is geared to a double-drum balanced hoist, and is controlled by means of a liquid rheostat. Each bucket carries a load of 30,000 lb. of water, and the hoist delivers at the rate of 200,000 gal. an hour.

Installations for power and lighting have been numerous. Probably the most noteworthy was that for the Davis Coal and Coke Co. at Thomas, W. Va., where one large plant produces power for a group of mines, giving increased tonnage at a much lower fuel cost, with a continuity of operation unattainable before this centralization.

The smaller apparatus, used in quantity, included the new G-E miners' lamp that precludes all possibility of firing mine gas, is long lived and proof against tampering. There are also rock drills and arc welding sets for quick repairs without the necessity of dismantling unless there is danger from gas explosions.

Canadian Production in 1916

The preliminary report of the mineral production of Canada during 1916 shows that the total output of marketable coal was 14,461,678 short tons valued at $38,857,557 as against 13,267,023 short tons valued at $32,111,182 in 1915, an increase of 9 per cent. in quantity and 21 per cent. in value.

Each of the coal producing provinces of the West shows not only an increase but also its maximum production. The Nova Scotia production was 6,894,728 tons, a decrease of 7.6 per cent. as compared with 1915; Alberta produced 4,563,020 tons, an increase of 35.8 per cent.; British Columbia 2,582,737 tons, an increase of 25.1 per cent.; Saskatchewan 280,835 tons, an increase of 17 per cent.; New Brunswick 137,058 tons, an increase of 7.6 per cent. The Yukon output was only 3300 tons.

The exports of coal were 2,135,359 tons valued at $7,-[illegible]9,387, as compared with exports of 1,766,543 tons in [illegible]15 valued at $5,406,058, an increase of 20.9 per cent. The imports of coal were 17,580,603 tons valued at $38,-[illegible]89,366, being an increase of 41 per cent. in quantity.

The total output of oven coke was 1,448,782 tons, as compared with 1,200,766 tons in 1915. Of the coke made in 1916, 1,501,835 tons were from Canadian coal and [illegible]3,076 from imported coal. By provinces the coke output was: Nova Scotia, 653,836 tons; Ontario, 452,502 tons; Alberta, 42,548 tons; British Columbia, 299,896 tons. Byproducts from coke ovens included 11,040 tons of sulphate of ammonia, 9,012,202 gal. of tar, 5,058,636 thousand cubic feet of gas. Benzol, toluol, naphtha and naphthalene were also produced. At the close of the year 1907 ovens were in operation. The imports of coke for the year, the highest on record, were 757,116 tons.

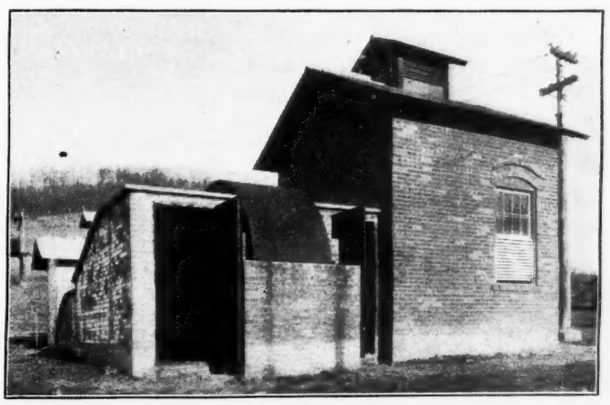
Saving Ventilation Expense

At the plant of the Clearfield Bituminous Coal Corporation, at Rossiter, Penn., two fans ventilated four mines. Each machine was direct connected to a steam engine, and each was forcing about 100,000 cu.ft. of air per minute against a 3-in. water gage. Each machine was approximately 14 ft. in diameter and 6 ft. wide.

About three years ago, the reciprocating engines in the main power plant were replaced by turbines direct connected to 2200-volt alternating-current generators.

For some time, however, the fans were retained with their engines, while a separate boiler plant supplied the steam.

These fans and engines were in excellent condition and worked satisfactorily. It was eventually deemed advisable, for reasons of economy, to drive the fans electrically. Accordingly, two new Robinson turbine fans were purchased and installed. These new machines are each 5 ft. 3 in. in diameter, and are direct connected to 100-hp. 2200-volt alternating-current motors, operating at about 400 r.p.m.



ROBINSON TURBINE FAN AT ROSSITER, PENN.

The substitution of these new fans resulted in many savings, chief among which is 22 tons of coal per day. At the present prices of coal, this alone is a decided saving, sufficient to pay for the entire installation of fans, housings, motors, etc., in less than 60 days.

Added to this high saving in coal, there is a decrease in operating costs, such as labor. This plant has now been in successful and satisfactory operation for somewhat over a year, and the owner is contemplating the installation of a similar plant at another mine.

The savings effected by these fans are at present abnormal on account of the high price which coal is now bringing at the mine. In making the calculations for the installation of this equipment, the value of the fuel required was figured at $1.20 per ton, which was about the average price such fuel was bringing at the mine at that time. At this price, it was calculated that the installation would pay for itself in about 15 months.

The Ramsay Mine-Run Sampler

By H. S. Geismer*

SYNOPSIS—In order to bring the operation of a mine to a high state of efficiency, it is necessary to have a daily record of the quality of the product. The sampler described takes a large representative sample from any mine car desired and renders it difficult for an unscrupulous miner to load an excess of impurities without detection. In the plant where this device was tried, the quality of the output was greatly improved through its use.

Probably the most difficult problem met with in attempting to bring a coal-mining operation to a high state of efficiency is that of finding a fairly accurate method of learning the quality of the coal that is being loaded by the individual miner. In most coal beds, there are partings composed of slate, bone, sulphur streaks, etc., which affect the quality of the coal and which the miners are supposed to separate from the coal while they are loading their cars at the working face.

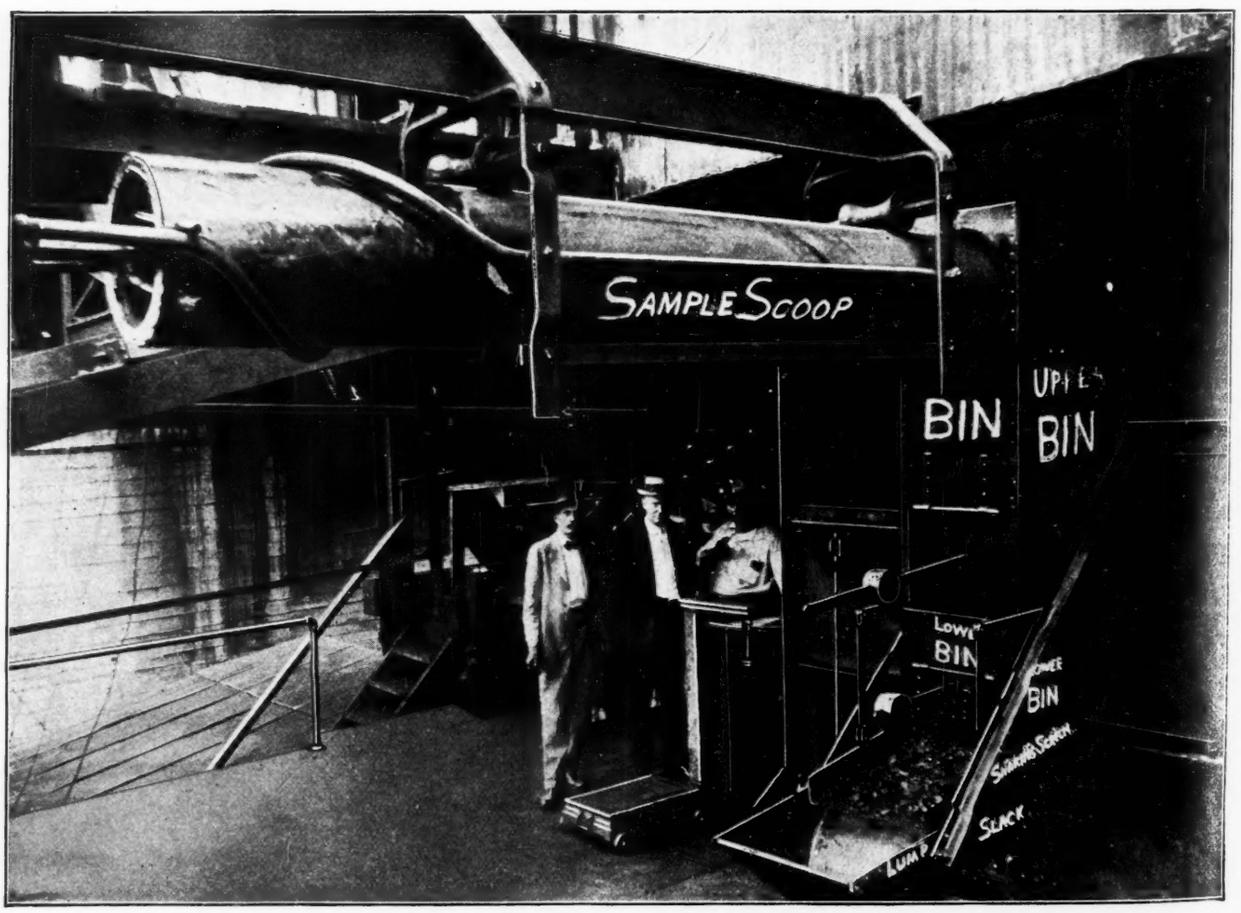
Another cause of variation in the quality of the coal loaded by the individual miner is the manner in which the material is shot. Lump coal, as a rule, is the most valuable, and the miner who places his shots so as to produce the largest amount of lump coal is getting the best results for his company.

At most mines dockage rules are in force that penalize the miner for loading more than a certain allowable quantity of rock or other foreign matter with his coal, also for producing too large a percentage of fine coal. The method generally employed to check up the miner is to pick a few cars at random during each day's operation, unload them carefully a shovelful at a time and inspect closely the entire contents of each car.

The weak point in this method is that only a few cars can be so inspected during a day's operation, and many miners who are willing to take chances load cars that should be condemned, without being detected. Another point to remember is that during the morning the miners generally load cleaner coal than they do late in the evening, when they are cleaning up the rooms. Thus it is hard to judge a man's average work by a single car.

Erskine Ramsay, first vice president and chief engineer of the Pratt Consolidated Coal Co., an Alabama corporation, has been experimenting for several years to perfect a mechanical sampler that would make possible the testing and inspection of a large number of mine cars without the necessity of actually unloading their contents. The experiments were carried on at the tipple of the company's mine at Banner, Alabama.

*Keiser-Geismer Engineering Co., Birmingham, Ala.



THE SAMPLER AT WORK IN THE TIPPLE

The contrivance finally perfected, the one that has been installed as part of the regular equipment at the mine, is fully illustrated in the accompanying photograph. On July 18, 1916, letters patent No. 1,191,227 were granted to Mr. Ramsay covering the invention. The sampler consists of a scoop made from a piece of 16-in. wrought pipe about 13 ft. long from which a piece about 3 ft. long in the top half at one end has been cut. This scoop will hold approximately a 100-lb. sample. It is placed underneath the regular dump.

This scoop is pushed out by means of an air cylinder so that it comes directly underneath the stream of coal as it is being dumped from the car. By means of the twisted guides, the scoop is revolved as it returns from its position under the chute and empties its sample of coal into a small bin. From this bin the material is dropped into a second bin, and from here it is fed onto a small shaking screen.

The screen separates the coal into two sizes. While the lump and nut coal is slowly traveling across the shaking screen, an attendant picks out the rock and other foreign matter. This screening of the sample expedites the work of the picker and makes it more effective. No attempt has been made at Banner to determine the amount of rock in the fine coal, but if it should appear that some of the miners were shooting up their slate so as to be able to load it out without being detected, the screenings from the sample could easily be tested by the float-and-sink method. After finishing with each sample, the attendant weighs the rock, slack and lump coal and records the percentage of each.

The object in having two bins, one above the other, is to provide a storage for one sample while a second is being fed out slowly onto the shaking screen.

One man operates the entire mechanism, obtaining as many as 100 samples in a shift besides picking out the slate, weighing the lump, slack and slate and making the necessary record. This record when carefully kept enables the operator to keep a close tab on his miners and also allows the miner to compare notes with his fellows, which makes it possible for the conscientious miner to get credit for his work.

When the scheme was first proposed, some were of the opinion that the 100-lb. sample might not be representative of the entire amount of coal in the tram-car; but the results obtained from the device, when checked with rejections from the washer, seem to indicate that the sampling is fairly representative. It is well to recall that a 100-lb. sample from a mine car is a relatively large sample, compared, for example, to the average sample taken from a railroad car under the methods at present in vogue.

The accompanying charts show graphically how the percentage of rock in the coal was reduced by the in-

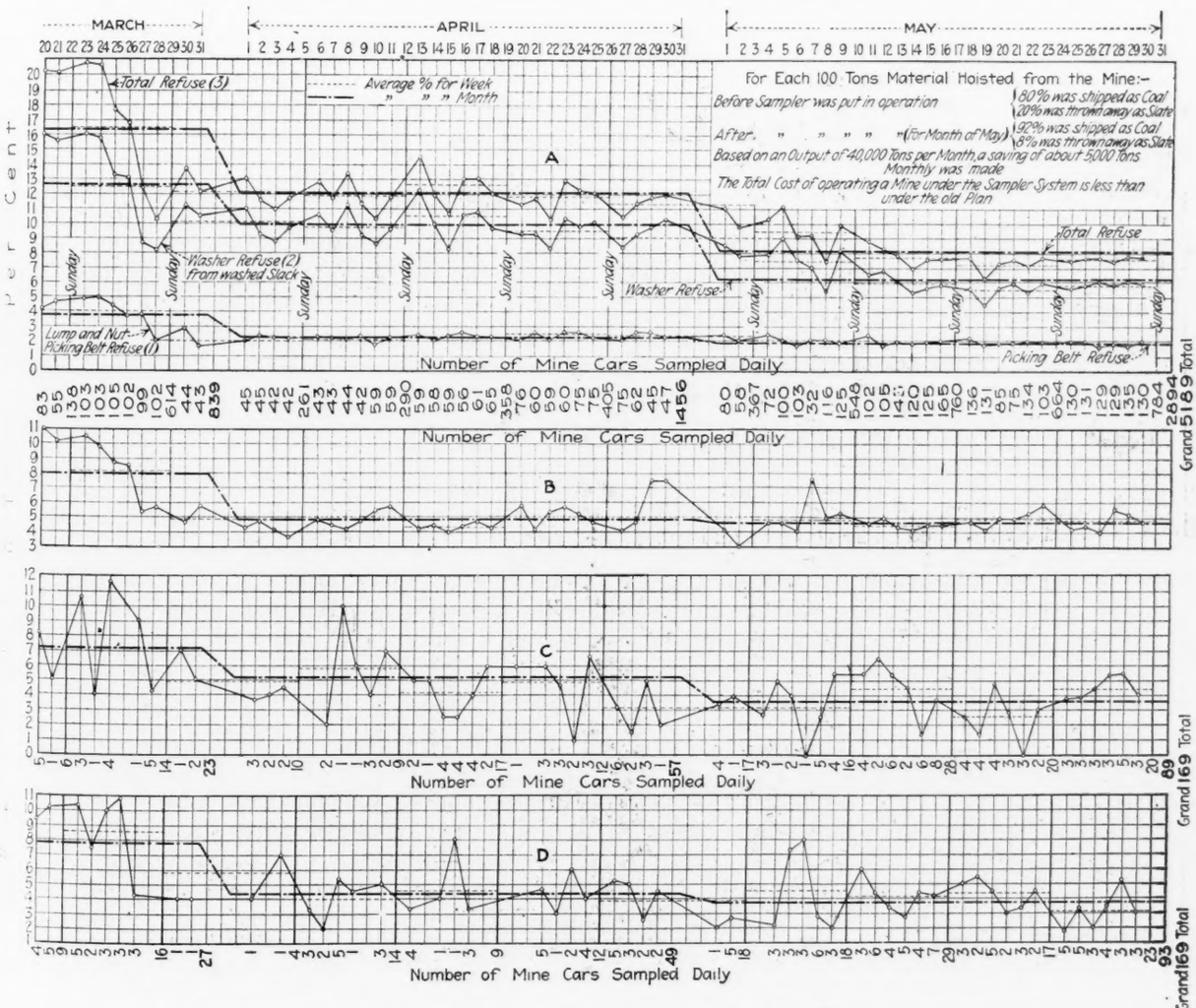

MARCH
APRIL
MAY
Per Cent
Total Refuse (3)
Average % for Week
" " " Month
For Each 100 Tons Material Hoisted from the Mine:-
Before Sampler was put in operation
80% was shipped as Coal
20% was thrown away as Slate
After " " " " (for Month of May)
92% was shipped as Coal
8% was thrown away as Slate
Based on an Output of 40,000 Tons per Month, a saving of about 5000 Tons Monthly was made
The Total Cost of operating a Mine under the Sampler System is less than under the old Plan
Washer Refuse (2) from washed Slack
Lump and Nut Picking Belt Refuse (1)
Washer Refuse
Picking Belt Refuse
Sunday
A
B
C
D
Number of Mine Cars Sampled Daily
Grand Total 5189
Grand Total 2894
Grand Total 169
Grand Total 169

DIAGRAM OF RESULTS OBTAINED BY SAMPLING

stallation of the sampler. The device was installed on Mar. 20, but the men were not notified until the twenty-sixth day of March.

Chart A gives three curves, all of them estimated as percentages of the entire output of the mine covering the period from Mar. 19 to June 1.

Curve No. 3 shows the total amount of refuse taken from the coal after it is loaded by the miner expressed as a percentage of the entire output; it was obtained by adding the weight of the refuse separated at the washer (curve No. 2) and the weight of the refuse thrown out by hand from the picking tables (curve No. 1).

All the coal as it comes from the mine is screened; the lump and nut is passed over picking belts, and the slack is taken to a coal washery.

The curve on chart B is based only on the mine cars that were actually sampled during the same period.

Charts C and D give the results as affecting two individual check miners, selected at random from the tonnage sheets.

Not only was the percentage of total refuse cut down from 20 to 8 per cent., but the number of slate pickers on the picking belts was reduced by half.

The particular sampling device as installed at Banner (shaft equipped with the Ramsay revolving dump), could not be installed in connection with all tipples. Consequently, Mr. Ramsay has worked out a device, for which he has applied for a patent, that will be adaptable to tipples equipped with horn or crossover dumps.

The method of handling the sample after it has been procured is practically the same as at Banner, but the method of obtaining it is entirely different. A series of small openings in the chute bottom is covered with movable plates controlled by levers conveniently arranged so that one man can operate them. This arrangement makes it possible to take several samples from one car or several samples from a trip of cars dumped in rapid succession. The entire apparatus could be made as a single structure, and its installation would simply require the cutting out of the openings in the bottom of the chute.

Indiana Record Coal Production

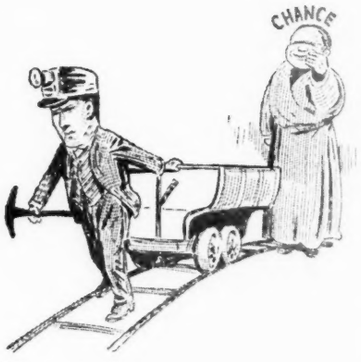
The American Mine No. 1 of the American Coal Mining Co., at Bicknell, Ind., which was described by Andrews Allen in our issue of Mar. 27, 1915, has succeeded in breaking the state record for the daily and annual production of coal. On Mar. 9 of this year the American broke the record for the best single day's hoist in the State of Indiana, hoisting 4777 tons in 7½ hours, or nearly 637 tons an hour. A train of 97 cars was loaded in that single shift. This train was over a mile in length. Had the shaft been supplied with cars for the remaining half hour, the day's run would have been more than 5000 tons.

THE SLOGAN

By RUFUS T. STROHM

Written expressly for Coal Age

In store and office, in mill and mine,
You'll find some fellows disposed to whine
And groan and grumble and croak and wail
Because they've never done much but fail.
They think they're victims of circumstance,
The laughing-stock of a fickle chance,
And so they whimper and wipe the eye,
Yet absolutely refuse to try.



The Laughing Stock of a Fickle Chance

The chap who rises above the ruck
To them is simply a fool for luck;
They don't consider how, checked and foiled,
And oft rebuffed as he thought and toiled,
He clenched his teeth on his trembling lip
And set his hands in a firmer grip
And kept on plugging the best he knew,
Till pluck had carried him bravely through.

They Think Success is a Goddess Fair

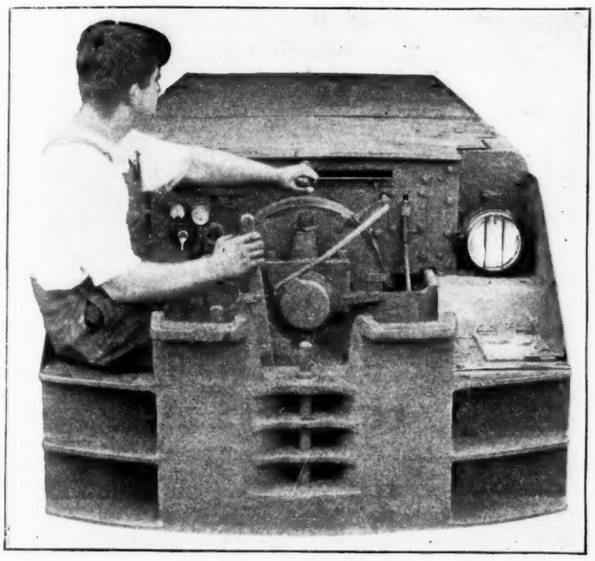
They think Success is a goddess fair,
Who dwells far off in the dim Somewhere,
And pays a visit to every man
But once or so in his mortal span;
Whereas she loiters, with winning smile,
Beside each one of them all the while;
Yet not a one has the spunk and sand
To make an effort to win her hand.

They like to boast of the way they'll strain
Each nerve and muscle and ounce of brain
To show their heels to the common mob
At some far day, in another job;
They cannot see that they do not need
New time and place for the victor's deed,
But just this message, in letters clear—
"The time is NOW, and the place is HERE."

A Successful Gasoline Locomotive

SYNOPSIS—While economy in fuel consumption is an important item in gasoline mine haulage, reliability is the prime requisite. To secure this the locomotive should be as simple as possible and amply heavy to withstand the rough usage to which it will be subjected.

The gasoline mine locomotive is of necessity a hybrid. It embodies features found in the railroad locomotive, the electric mine locomotive and the automobile. The experience of many years in the manufacture of all types of tractors has entered into the building of the mine locomotive. The brakes and sanding mechanism are patterned



END VIEW OF LOCOMOTIVE

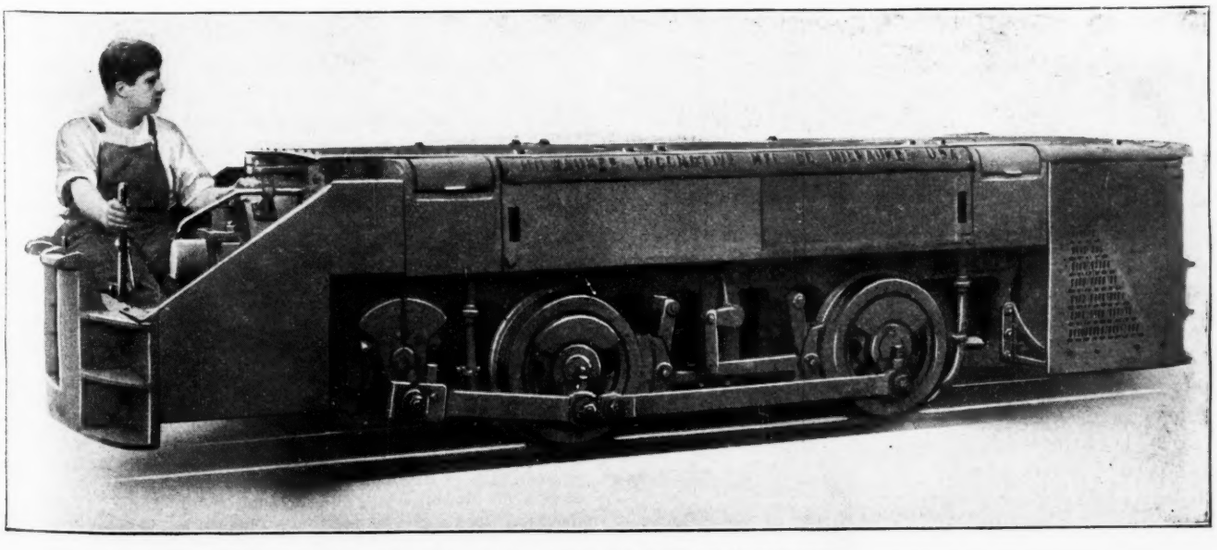
closely after those of the steam-actuated locomotive; the frame, wheels and general appearance of the machine are analogous to those of the electrically propelled type, while the engine is essentially an automobile motor, designed for and adapted to the rough usage encountered.

Of course, it is the intention of the designer to incorporate in this type of locomotive only those features of other machines that have stood the test of time and usage; and while economy of fuel and a low cost of haulage per ton-mile are important considerations, the prime requisite is reliability. In all mining work, but particularly in a department as vital to success as that of transportation, delay is vastly more expensive than repairs. A stoppage of one hour on the main haulage may entail more loss to the mine than the entire cost of the locomotive. Miners are extremely sensitive about the car supply, and if empties are not to be had promptly they have a pronounced proclivity for quitting and going home. The loss of a day's output, particularly in these times of abnormal prices, may mean the loss of a tidy little sum. In addition, it may entail serious damage to the morale of the operating force.

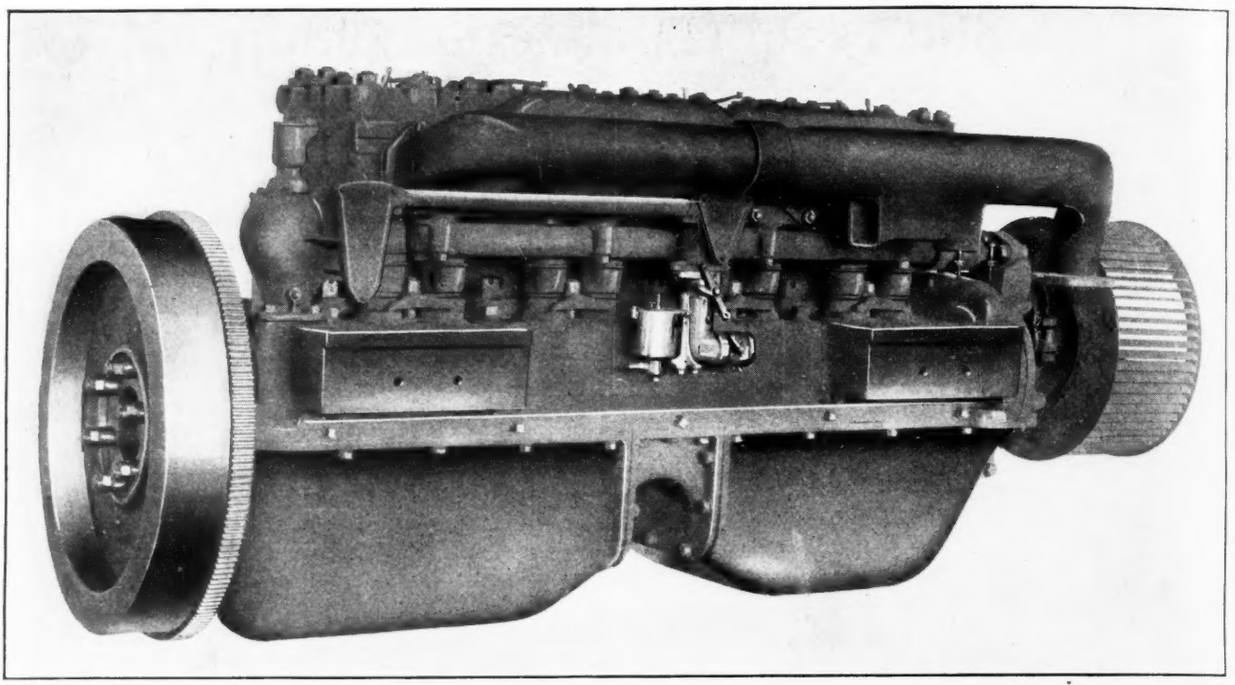
The Milwaukee Locomotive Manufacturing Co. has for some time been building and marketing a gasoline-propelled locomotive weighing approximately 8¼ tons and known as its type L-50. This machine has been designed to withstand the severe usage of the mine and has been in service long enough to demonstrate its success.

The machine is geared for two speeds—namely, 4.3 miles and 8.5 miles per hour—at an engine speed of 900 r.p.m. The motor is sufficiently powerful at this rotational speed to deliver 50 hp. to the rails, while the drawbar pull, under good track conditions, is 4000 lb. with the machine in low gear or 2200 lb. in high gear. The locomotive will haul a gross load weighing 125.3 tons on a level, allowing 30 lb. of drawbar pull per ton of load. In high gear, under like conditions, it will haul 65.3 tons. On a 3 per cent. grade the machine will haul 36.4 tons in low gear or 16.4 tons in high gear.

This machine may be built for track gages ranging between 36 and 48 in. The length over all is slightly more than 14 ft.; the wheelbase is 50 in. and the height above the rail 39 in. The side frames are of openhearth cast steel of the bar type. A unique feature in the construction is that the front end bumper is cast hollow, through which the exhaust from the engine is made.



GENERAL SIDE VIEW OF THE LOCOMOTIVE

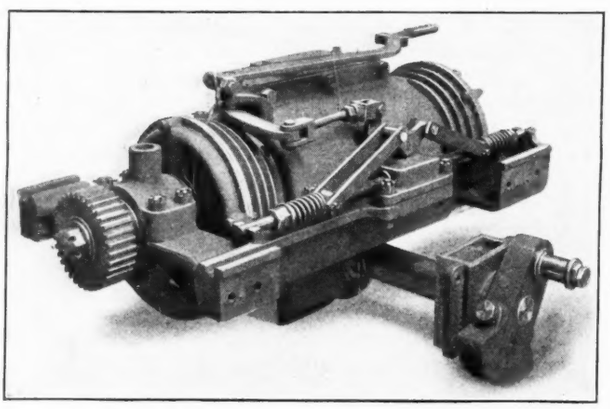


SIDE VIEW OF ENGINE, SHOWING HEAVY CONSTRUCTION

This not only muffles the exhaust to a marked degree, but also cools the gases and renders the escape of sparks to the mine atmosphere improbable.

Motion is transmitted to the drivers, which are 20 in. in diameter and carry steel tires shrunk on cast-iron centers, by means of connecting-rods and side rods. This is a more simple method of transmitting motion than the sprocket chain and one that follows closely steam-locomotive practice.

Regardless of how well a locomotive of this type is designed and how carefully it is constructed, it would be of little value if the engine was not strong and reliable.



CLUTCH, SHOWING HEAVY CONSTRUCTION

The motor employed in this machine is of the four-cycle, four-cylinder type, delivering 50 hp. to the locomotive drivers at 900 r.p.m. Considering its power, it is remarkably heavy, as may be judged from the fact that its total weight is 3200 lb. The crankshaft of this engine is of forged, heat-treated steel, while all bearings are finished and ground. The camshaft is a hardened drop forging, the cams being made integral.

The gasoline supply is intentionally small, consisting of two 7½-gal. tanks that are carried in a position which is thoroughly protected. These tanks are of seamless drawn steel, coated with lead both inside and out. They cannot be filled while in the locomotive, but may be quickly removed for filling purposes and as quickly replaced.

Like the modern automobile, this machine is provided with a high-tension magneto for ignition, also a generator and a magnetic switch, automatically maintaining constant voltage. This latter furnishes current for the lighting system. A storage battery supplies current for lighting when the engine is not in operation. An extension cord is provided together with an inspection lamp for use in making repairs, etc. Each end of the locomotive has an electric headlight in a suitable iron case.

The machine is equipped with an electric starter of sufficient capacity to crank the engine. A hand-starting crank, also provided, is in the form of a detachable ratchet lever. A safety device is also furnished which is automatically thrown into operation when the hand-starting crank is placed in engagement. This obviates the possibility of the engine "kicking" and injuring the operator.

The operating lever, brake lever and other control devices are so arranged as to be most convenient when the driver is sitting crosswise on the locomotive. In this position he readily has a view either forward or backward along the track.

As may be judged from the foregoing, this machine is extremely heavy and rugged in design. It is consequently reliable in operation. Tests of the machine in use have also, in many instances, shown a decided degree of economy.

Where Liquid Hydrocarbons May Be Used in Briquetting—The new process controlled by the General Briquetting Co., of New York, marks a great improvement in the coal-briquetting art. The only criticism formerly reported by dealers in the sale of Komarek briquettes arose from the dust or breakage in handling—a disadvantage common to all small briquettes made from friable coals and hard pitch binder. That the new process entirely overcomes this objection is proved by the fact that the plant has operated continuously 24 hours per day since cold weather set in.—C. T. Malcolmson.

Blue Diamond Coal Co.'s Plant at Cardiff, Ky.

By H. Reisser*

SYNOPSIS—A successful plan for the elimination of much coal dust in the headings of a Kentucky mine by the use of tight cars, swivel couplings and a rotary dump. By careful sizing, picking and loading the good qualities of a nonfriable coal having 3½ per cent. of ash and 0.5 per cent. of sulphur are preserved for the market.

Those interested in the development of coal territories will no doubt recall the announcement, only recently made, that the Louisville & Nashville Ry. had completed the extension from Jackson, in Breathitt County, to Hazard, in Perry County, Kentucky. Right on the heels of this announcement came the word that some rich coal and timber fields had been tapped by this extension, and on the First Creek branch of this new development no time was lost in installing coal-preparation plants, some of the mines being ready to market their product almost before the railroad was completed.

GENERAL VIEW OF SURFACE PLANT

First Creek drains into the north fork of the Kentucky River, 3½ miles from Typo. It is at Cardiff, Perry County, Kentucky, along this stream, that the Blue Diamond Coal Co.'s mine, which was among the first to be ready to operate, is located. The coal company owns a large acreage of land and is producing coal from what is known as the Hazard seam.

The coal bed lies practically level and is found at an elevation of about 700 ft. above sea level. The seam runs from 6 to 7 ft. thick, and the coal is almost free from impurities.

The product is hard and does not break up in handling. It stocks well and lends itself to perfect preparation. Undercutting machines are used in mining; the drilling for shots is done with electric drills, and mine cars of a capacity of 3 tons are used for the transportation of the coal from the working face to the retarding conveyor.

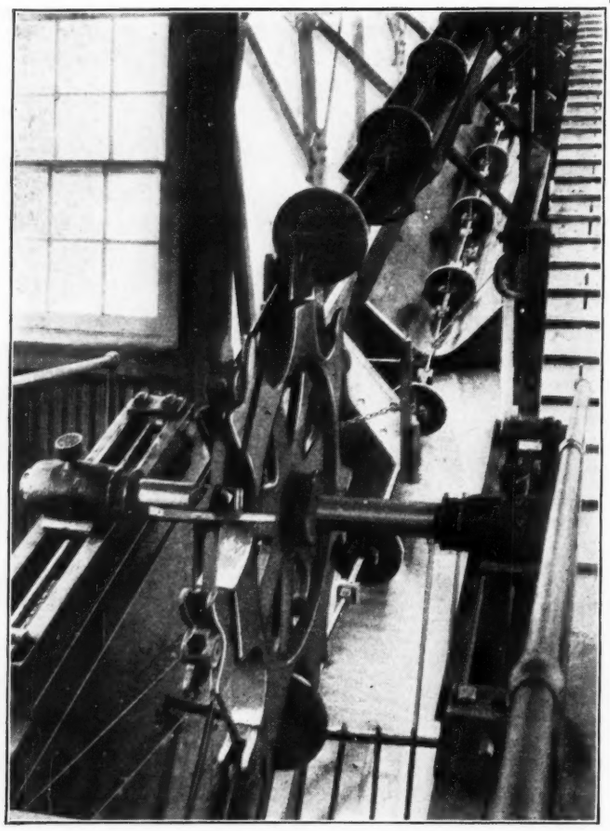
An analysis of the fuel is as follows: Volatile matter, 39 per cent.; ash, 3½ per cent.; sulphur, ½ of 1 per cent. It is sold under the trade name of Blue Diamond Coal, for use mainly as a domestic product for which it is well suited owing to its splendid resistance to breakage in transportation, its excellent stocking qualities and its quick ignition and low ash content, which qualities the consumer desires.

In this district, as in West Virginia, the coal bed is located well up from the creek bed, and drift openings afford means of bringing the coal to the loading points; but it is necessary to employ retarding conveyors to bring the coal down toward the level of the railroad track.

Although this mining district is probably the youngest in age of development, it is demanding the most modern equipment for coal production and preparation. The Blue Diamond Coal Co. at the outset adopted what is probably the best type of mine car, in that it has no gates and can be made close and tight. This is not only economical from a first cost and upkeep standpoint, but permits of running the cars in either direction to and from the dumping point, thus eliminating time in switching and arranging trips, etc. A still more important feature in favor of a car of this type is the fact that it does away with the continual leaking of coal dust into the entries and haulageways, and thus avoids the filling of the roadways with the powdered coal, which has been long recognized as such an important element in the causation and extension of mine explosions.

The cars are discharged by a power-operated revolving dump. This type of dump was first developed to satisfy

*Chicago, Ill.



DISCHARGING END OF DOWNHILL CONVEYOR

a need in fields where the laws required cars with closed ends, and special features have been added to suit the requirements of this district. The Blue Diamond Coal Co. deserves credit as being the first corporation in this district to recognize the importance of closed-end and closed-bottom cars.

The rotary dump is novel in that it handles the cars without their being uncoupled from the trip, the center of the dumping ring being coincident with the couplings of the car. The coupling is of the swivel type, and thus it is possible to revolve the cars in the dump without detaching them from the trip. The tracks approaching the dump and passing through it and beyond are placed on a grade in favor of the load, and the trips are controlled by a series of automatic car stops. These take the impact of the oncoming loaded trip and the pull of the empty cars, and allow the dumping car perfect freedom in action, at the same time giving sufficient inertia to the emptied car to move away quickly. As the dump is power driven, the coal in being discharged is subjected to a minimum of shock and is thus saved from much breakage.

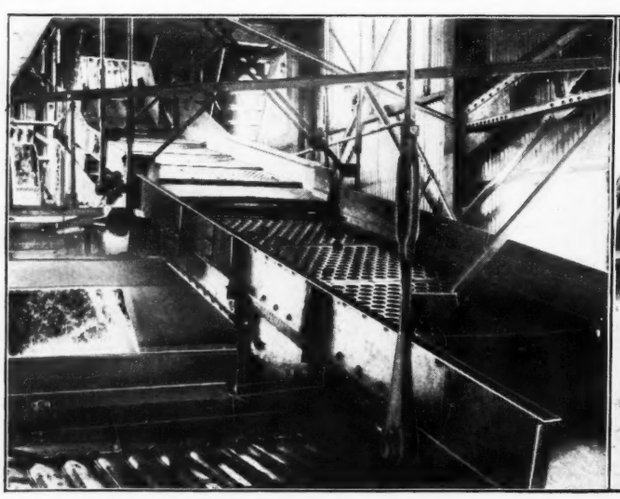
The cars are handled in train over the scales as well as through the dump. The weighing is done while the cars pass over the scales, the spacers or stops being so arranged as to allow each car to move freely, gravity acting only upon its own weight and load, thus permitting the taking of an accurate weight of each car without the influence of exterior forces acting through the hitchings.

From the dump the coal is discharged into a hopper. A reciprocating feeder then delivers it at a uniform rate to a retarding conveyor of the Monobar Link-Belt type. Circular disks, mounted on the Link Belt at regular intervals, travel in a flared trough with a curved bottom. At the lower end of the retarding conveyor the coal is delivered to the shaking screens.

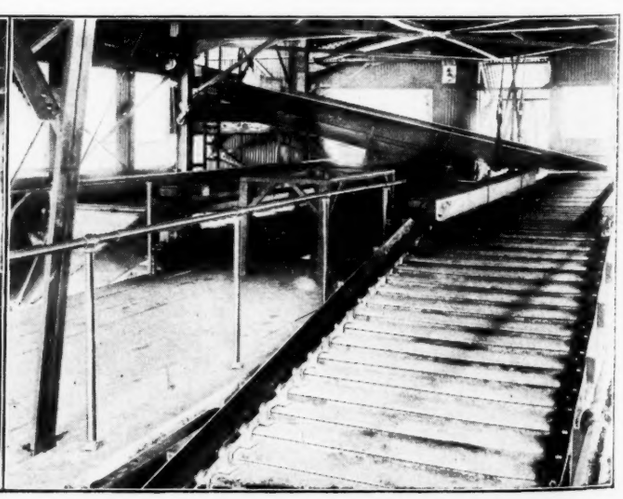
The shaking screens are of the inclined type, hung in tandem by adjustable hangers. This permits them to be adjusted so that by the action of gravity and reciprocating motion perfect screening can be obtained with a most delicate handling of the coal. The screens separate the fuel into four sizes—slack, nut, egg and lump. The slack passes through the upper screen into a combined slack and run-of-mine hopper placed under the screen and directly over the inside loading track. Run-of-mine can also be delivered to this hopper without operating the screens. A gate is provided for controlling the passage of either the large or the small-sized product to the railroad cars.

The lower screen is fitted with two sizes of screen plates, so that nut coal can be placed on either the inside track with the slack as a slack and nut product, or with the egg, as an egg and nut product. The lower section of the screen removes the egg and delivers it onto an egg picking table. This permits a thorough cleaning of the product, and at the end of the table it is loaded into the railroad car through a discharge chute with an extension for low cars.

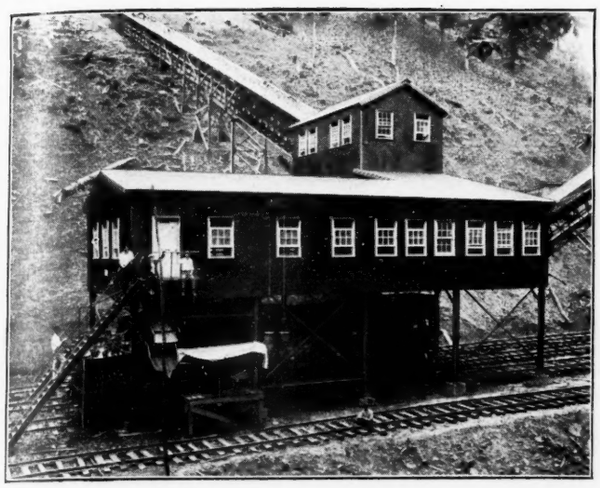
The lump coal passes on and is transferred to a combined picking table and loading boom, where it is cleaned



VIEW LOOKING UP SHAKING SCREEN



EGG PICKING TABLE AND LUMP LOADING BOOM



CLOSE VIEW OF TIPPLE

and lowered into the railroad car with no drop. When loading box-cars, the boom is raised high enough to allow the coal to pass into a chute which delivers it to a Manniere box-car loader on the outside track.

For the disposal of the refuse picked from the egg and lump coal, a small apron conveyor moving in the opposite direction to the picking tables is placed directly between them. It carries the refuse back and upward into a 50-ton bin. From this bin it is loaded into railroad cars and disposed of as desired.

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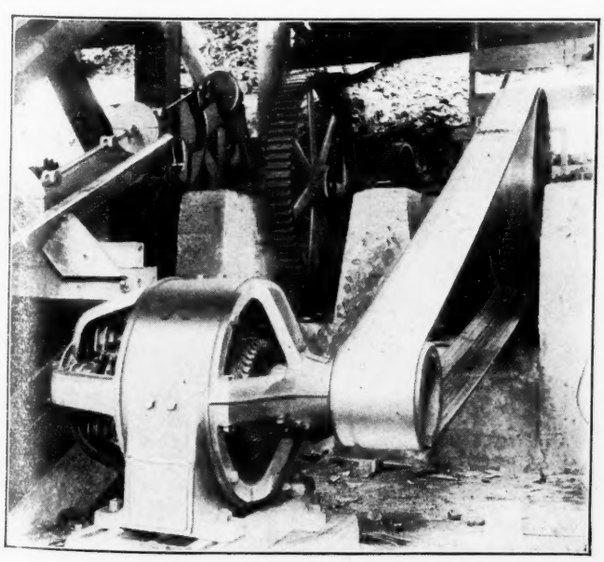

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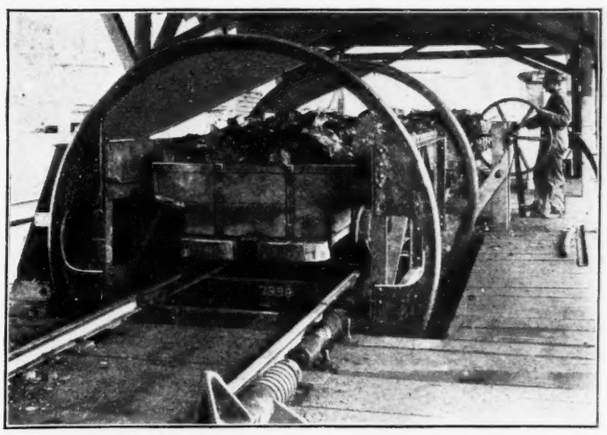

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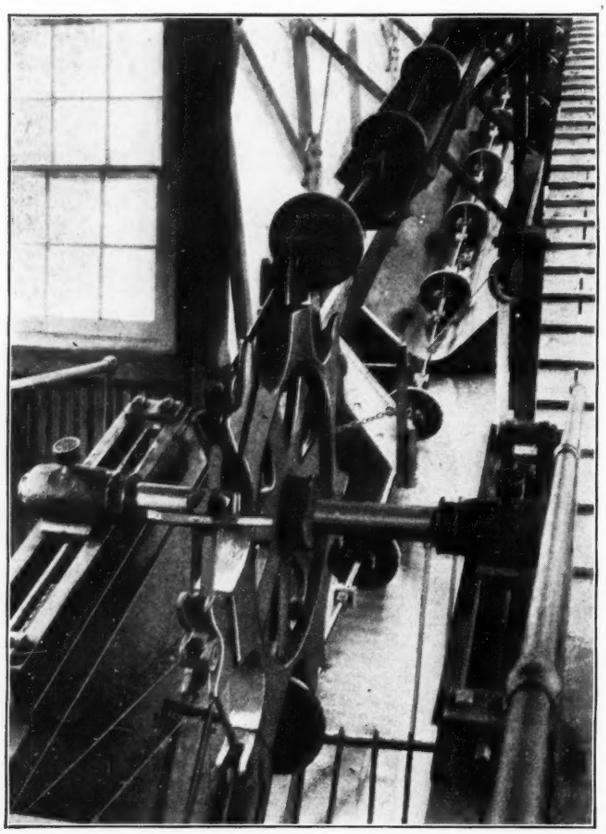


DISCHARGING END OF DOWNHILL CONVEYOR

a need in fields where the laws required cars with closed ends, and special features have been added to suit the requirements of this district. The Blue Diamond Coal Co. deserves credit as being the first corporation in this district to recognize the importance of closed-end and closed-bottom cars.

The rotary dump is novel in that it handles the cars without their being uncoupled from the trip, the center of the dumping ring being coincident with the couplings of the car. The coupling is of the swivel type, and thus it is possible to revolve the cars in the dump without detaching them from the trip. The tracks approaching the dump and passing through it and beyond are placed on a grade in favor of the load, and the trips are controlled by a series of automatic car stops. These take the impact of the oncoming loaded trip and the pull of the empty cars, and allow the dumping car perfect freedom in action, at the same time giving sufficient inertia to the emptied car to move away quickly. As the dump is power driven, the coal in being discharged is subjected to a minimum of shock and is thus saved from much breakage.

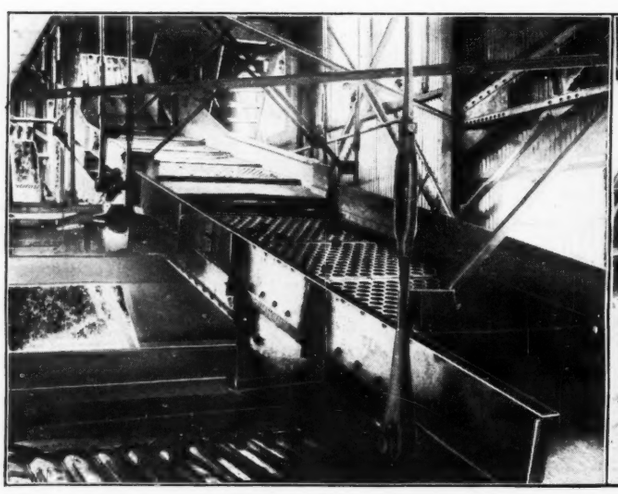
The cars are handled in train over the scales as well as through the dump. The weighing is done while the cars pass over the scales, the spacers or stops being so arranged as to allow each car to move freely, gravity acting only upon its own weight and load, thus permitting the taking of an accurate weight of each car without the influence of exterior forces acting through the hitchings.

From the dump the coal is discharged into a hopper. A reciprocating feeder then delivers it at a uniform rate to a retarding conveyor of the Monobar Link-Belt type. Circular disks, mounted on the Link Belt at regular intervals, travel in a flared trough with a curved bottom. At the lower end of the retarding conveyor the coal is delivered to the shaking screens.

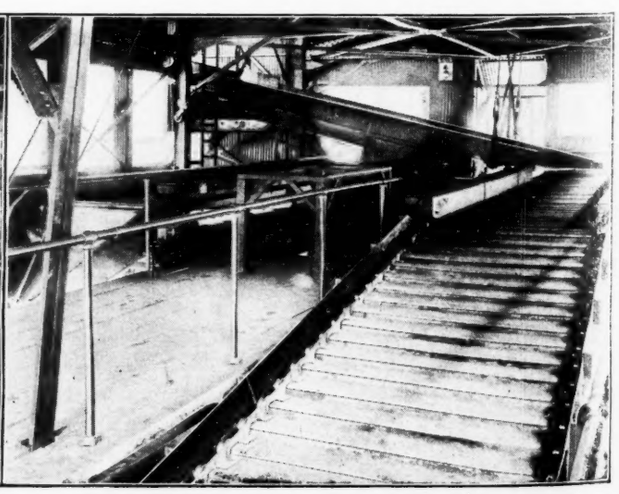
The shaking screens are of the inclined type, hung in tandem by adjustable hangers. This permits them to be adjusted so that by the action of gravity and reciprocating motion perfect screening can be obtained with a most delicate handling of the coal. The screens separate the fuel into four sizes—slack, nut, egg and lump. The slack passes through the upper screen into a combined slack and run-of-mine hopper placed under the screen and directly over the inside loading track. Run-of-mine can also be delivered to this hopper without operating the screens. A gate is provided for controlling the passage of either the large or the small-sized product to the railroad cars.

The lower screen is fitted with two sizes of screen plates, so that nut coal can be placed on either the inside track with the slack as a slack and nut product, or with the egg, as an egg and nut product. The lower section of the screen removes the egg and delivers it onto an egg picking table. This permits a thorough cleaning of the product, and at the end of the table it is loaded into the railroad car through a discharge chute with an extension for low cars.

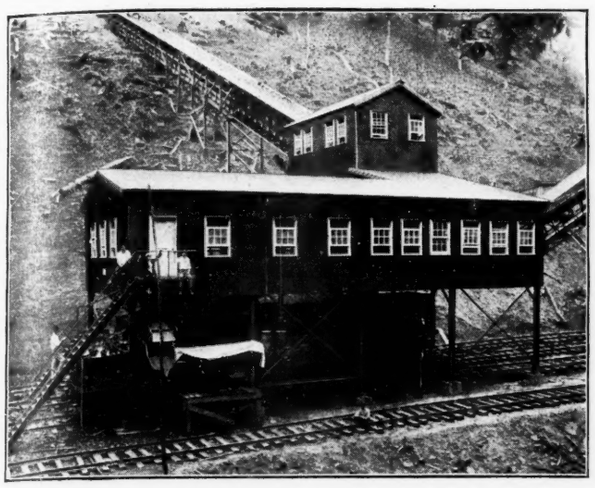
The lump coal passes on and is transferred to a combined picking table and loading boom, where it is cleaned



VIEW LOOKING UP SHAKING SCREEN



EGG PICKING TABLE AND LUMP LOADING BOOM



CLOSE VIEW OF TIPPLE

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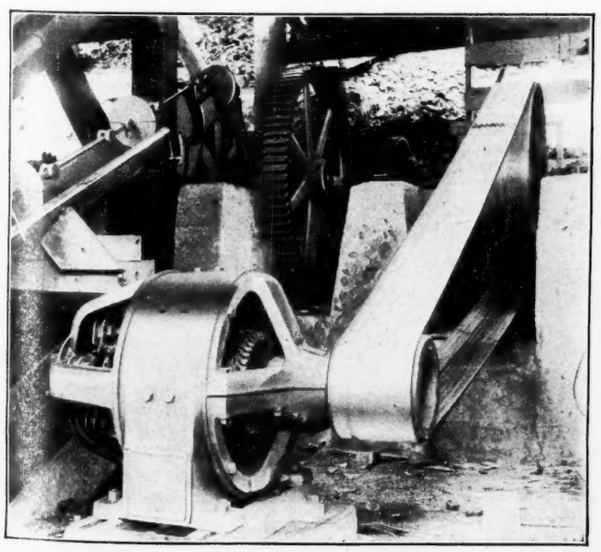

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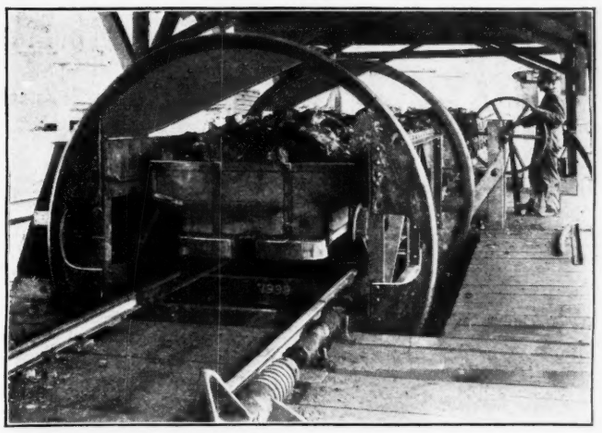

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A Successful Investment

When a new company takes over the holdings of an old one, and by efficient management doubles the output of a mine 15 years old within two years, and after four wage increases and a serious car shortage shows a reduction in production costs, some mention of it would seem worthy of a place in this issue. To realize what was accomplished, it must be understood that the plant, when taken over, was as a whole probably in the worst physical condition of any in the state.

We will call this plant No. 1. One of the first defects remedied was that of the electrical power. While the mine had steam equipment of its own for hoisting, ventilation and air compression, it was deriving its electrical power for coke-drawing machinery from another plant, which we will designate as No. 2, owned by the same company. This source of power was of entirely too small a capacity for both plants. Instead of replacing this power plant at No. 2, the entire outfit of three 125-hp. return tubular boilers and two 125-kw. generators was abandoned, and three 200-hp. boilers and two 200-kw. generators were installed at No. 1, replacing three 125-hp. boilers and one air compressor.

This plan proved successful from the first, full voltage being supplied both plants at all times; also the one power plant serving in the place of two resulted in reducing the labor force from six firemen to three. In addition, there was a saving of 20 tons of fuel at No. 2, a considerable reduction at No. 1 also, and an increased steam pressure of 40 lb. for the hoist.

The mine, which had been using compressed air for its drainage pumps, was now wired throughout for electrical equipment. Up-to-date chain cutting machines were installed, making machine mined coal about 87 per cent. of the entire output. The installation of these machines raised the average production per man, including pick men, from less than 8 to 17 tons.

All wood rails were replaced by 20-lb. steel rails, and a sufficient supply of these were kept on hand at all times and distributed near enough to the loaders so that there was never any time lost in hunting up track material. In fact, everything possible was done within reason for the loader, so that he could load his run as expeditiously as possible. This idea has worked out as was expected, the majority of the men being out of the mine by two o'clock, which has proved a decided factor in securing and holding men.

The old safety lamps, with the exception of those used by officials, shotfirers and machine men, were replaced by electric lamps. A peculiar condition arose at the time these lamps were installed. As a tryout, 65 lamps were ordered and put in service among the loaders. As soon as they discovered this, every loader in the place purchased a cap for use in connection with this type of lamp. Of course, there were not sufficient lamps to go around, and those not receiving one accused the mine foreman of partiality, etc.

It was then decided to furnish those who first arrived in the morning. The lamp took so well with the men and gave such good results that a complete outfit was eventually installed. These lamps have been in use for over eighteen months and up to date have cost less in upkeep than the naphtha lamp. It is figured that even if they cost more in dollars and cents they would prove more economical on a basis of tons produced and the greater safety connected with their use.

In addition to the original shanties and houses, 60 five-room single dwellings, with water and sewer connections, have been put in, each house having a fenced-in lot 50 x 150. About twenty-five of these houses have been sold to employees on the easy-payment plan at cost plus interest.

These new living conditions, together with bettered inside working arrangements, have been the means of securing a much larger amount and better class of labor, as a result of which the output was so materially increased that a second opening had to be made and another tipple erected to take care of the increase.

Installation in Record Time

Installed and running in 14 days from the receipt of the order is a record that can be equaled by few large pieces of mine machinery. The Manierre Engineering and Machinery Co. points to the box-car loader now at work at the East Broad Top Railroad and Coal Co.'s mine at Mount Union, Penn., as an example of a successful installation in record time.

On Feb. 24, 1917, the Manierre company received an inquiry by wire as to its ability to supply a loader from stock to suit the necessities of the East Broad Top company, which were outlined briefly. An affirmative reply, with a request for more information, was at once dispatched. Then came an interchange of telegrams which resulted on Feb. 28 in a definite order for a standard type of long reach box-car loader to be delivered, installed and running inside of two weeks.

This order was canceled on Mar. 1, and a different type of loader requested. The new order was accepted on Mar. 2. A special chute, in addition to the newly specified type of loader, was complete on Mar. 9, and was shipped that day via Adams Express.

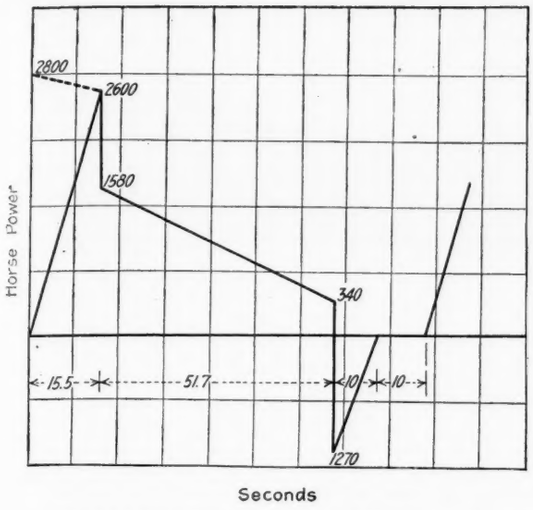
In 7 days from that date the machine was installed and running successfully at the East Broad Top Railroad and Coal Co.'s mine at Mt. Union, handling run-of-mine coal into box-cars from the end of a loading boom. From the time the final order was accepted until the machine was actually at work, just 14 days were required for this unique rush installation.

Large Electric Hoist

A large electrically driven hoist was recently furnished by the Vulcan Iron Works, of Wilkes-Barre, Penn., to the Canadian Mining and Finance Co. for installation at the Hollinger Consolidated Gold Mines, Ltd., J. Norman Bulkley, consulting engineer, at Timmins, Ontario. Although this is not a coal mine, there are many features embodied in this hoist that are of interest to coal-mining men.

The ultimate depth of the central shaft at the Hollinger mine will be 3000 ft. This hoist is designed to handle an unbalanced net load of 10,000 lb. at a maximum hoisting speed of 2800 ft. per minute, while the hourly capacity is 208 tons. The ultimate hoisting rope will be 1⅛ in. in diameter, and will handle a load made up as follows: Rock, 10,000 lb.; skip, 6000 lb.; rope, 9000 lb.

This duty will give a hoisting cycle as per the accompanying diagram. Since at present the shaft is down only 800 ft., it is considered inadvisable to install the



DIAGRAMMATIC CYCLE OF OPERATION

large motor required by the final hoisting cycle, especially as the power station is only of limited capacity. The hoist is therefore temporarily driven by a 500-hp. alternating-current motor operating at 485 r.p.m. through double reduction cut herring-bone gears, so as to bring the maximum hoisting speed down to 750 ft. per minute.

Eventually this temporary drive will be replaced by a direct-current motor operating at 89 r.p.m. and fitted with a Ward Leonard control. This motor will be connected directly to the hoist by means of the flange coupling seen at the extreme right in the accompanying illustration. This coupling is forged integral with the drum-shaft of the hoist.

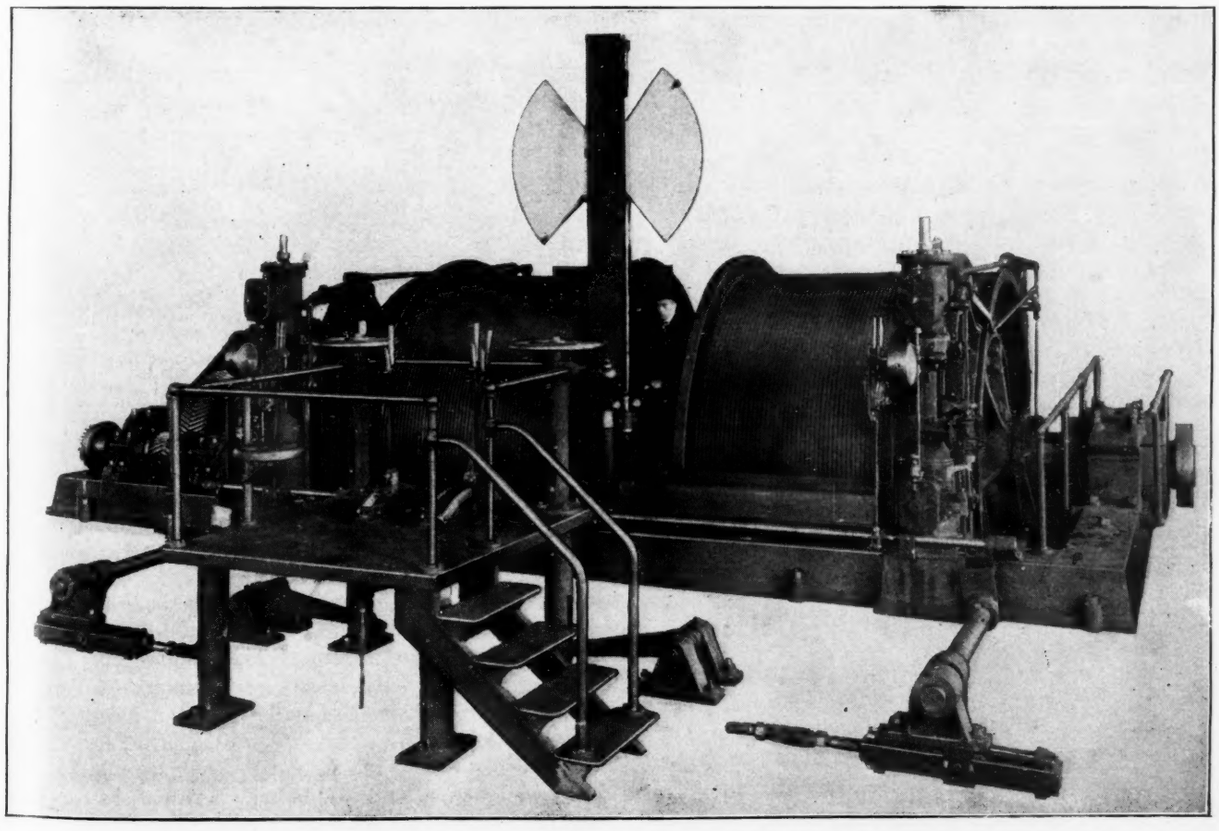
This hoist departs somewhat in its details of construction from what might be accepted as current American practice, and has embodied certain features that closely follow South African hoisting practice. Among these the use of an internal machine-cut toothed clutch in place of the usual friction clutch is deserving of special mention.

The machine is equipped with powerful air-actuated post brakes. It is also provided with a Vulcan standard indicator of the vertical type. This is so arranged that at the landing point the indicating pointer has a travel about 15 times as great per lineal foot of cage movement as in the main part of the shaft.

The control is arranged to fulfill the following conditions: (a) Start, stop and reverse the hoist; (b) control acceleration and retardation independently of the driver; (c) permit of running at very low speeds with light loads for rope inspection, etc.; (d) cut off power and apply the brakes in case of an overwind; (e) apply the brakes in case of failure of the power supply; (f) prevent the brakes being released on an unclutched drum and prevent unclutching with the brake off; (g) prevent more than sufficient current to hold skip being applied with brakes on; (h) prevent the hoist being started in the wrong direction when the skip is in tip.

The brakes are independently operated by power, but are so arranged that the operator can manipulate both brakes by means of one lever only. The full Vulcan patented control system is supplied with this machine, giving complete automatic protection from overwinding, overspeeding, starting in the wrong direction, etc.

This machine is known as a skip hoist. Another hoist built along the same general lines, but smaller, and known as the cage hoist (for handling men and material), is now being erected and will be ready for shipment soon.



GENERAL VIEW OF HOIST ON ERECTING FLOOR

Power Plant of Montana Coal and Iron Co.

By Benedict Shubart*

The power plant of the Montana Coal and Iron Co., at Washoe, Mont., is a pleasant sight to the visiting engineer. Usually the power plant of a coal mine, like Topsy, "just growed." However, in 1914 the mines at this point had reached such proportions that the operating company decided to build a new plant instead of increasing the old one.

An entirely new site was selected after consultation with engineers, and J. M. Freeman, general manager of the company, placed the design of the plant with Lindrooth, Shubart & Co., of Denver, which firm placed the equipment contracts. The construction and installation was under Mr. Freeman's direction.

FRONT OF BOILERS AND FURNACES

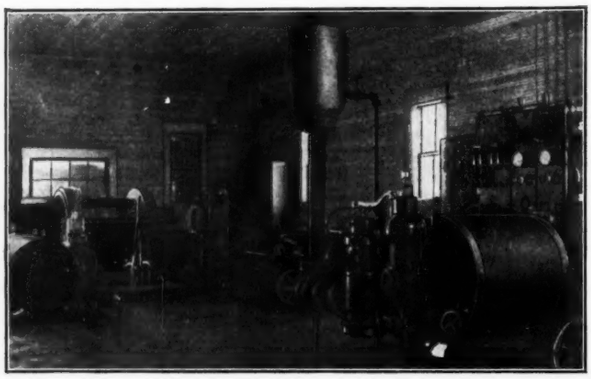
The plant shows no unusual features. No noteworthy or extraordinary engineering feats were attempted, but the plant is compact and a model of straightforward design, simplicity and accessibility.

Power is required for two purposes—for the hoist and for the generators, which furnish energy to five or six 7-ton Goodman locomotives and eight Goodman chain breast machines, as well as current for lighting and operating the tipple.

Three Class A No. 15 Stirling boilers of 200 hp. each furnish steam. To secure the best efficiency from the coal, a sub-bituminous slack, dutch ovens were used in connection with Argand blowers and 90-ft. stacks.

The steam and exhaust piping was carefully laid out to avoid condensation and water hammer. Webster separators and Boylston traps were used for draining. All exhaust is returned to an 800-hp. Type EB Webster vacuum feed water heater.

*Denver, Colo.

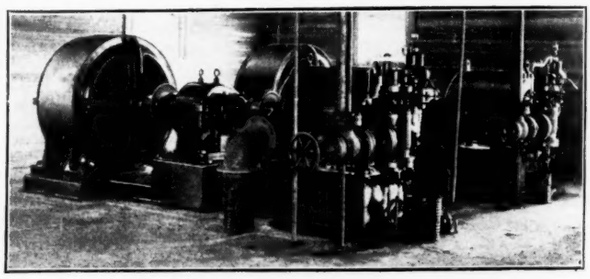


THE 500-HP. LITCHFIELD HOIST

SLACK TRAMWAY AND CONVEYOR

Two 150-kw. Kerr turbo-generators furnish direct current at 250 volts. These machines are of the geared type, with a turbine speed of 2500 r.p.m. and a generator speed of 1200 r.p.m. The current is distributed through a Westinghouse three-panel black marine slate switchboard.

Slack coal is burned under the boilers. It is necessary to waste a considerable amount of the slack during a portion of the year, and a wire rope tramway was installed some years ago for this purpose. This has been tapped at an intermediate point by a Link-Belt flight conveyor, about 210 ft. long, of the suspended flight type, using 12-in. flights on a single strand of No. 730 chain, which takes the coal to the coal bunkers.



A CORNER OF THE POWER PLANT

The main hoist is placed in the engine room. This is a 500-hp. steam-driven Litchfield second-motion machine, with a 5-ft. drum, carrying about 2000 ft. of $1\frac{1}{8}$-in. rope that travels at a speed of 1000 ft. per minute.

The plant has now been in operation almost three years. It is a good example of a successful mine plant, for it is practically free from all troubles, is simple to handle, and is so well laid out that it still looks like a new installation. It is needless to say that this plant has had good attention. Mr. Freeman believes in employing competent men and gets them.

New York Anthracite Prices

The formal price circular issued by the Philadelphia & Reading Coal and Iron Co. shows the following prices for New York (Port Reading) Tidewater:

	Egg	Stove	Chestnut
White ash	$5.45	$5.70	$5.75
Shamokin	5.70	5.95	5.95
Schuylkill red ash	5.95	6.20	6.25
Lorberry	5.95	6.20	6.25
Lykens Valley	6.45	6.70	6.75

A reduction of 50c. a ton will be allowed from the foregoing prices on shipments during the month of April.

The prices announced by another of the large operating companies are: Egg, $5.45; stove, $5.70, and chestnut, $5.75, less 50c. discount on shipments during April. For Philadelphia, line and Buffalo trade the mine prices are: Egg, $4.15; stove, $4.40, and chestnut, $4.50, less 50c. reduction on shipments during April.

One of the leading selling agents announced the following prices: Egg, $5.50; stove, $5.75; chestnut, $5.80, pea, $4.60; stove, chestnut and pea are subject to a reduction of 50c. for shipments during April.

While no formal announcement has as yet been made, it is said the retail prices in Manhattan will be: Family trade, broken and egg, $7; stove and chestnut, $7.25; pea, $5.75; buckwheat No. 1, $5.25; red ash, 25c. higher. Apartment houses, broken and egg, $6.75; stove and egg, $7. Steam trade, pea, $5.50; buckwheat No. 1, $5; rice, $4.50, and barley, $4. In Brooklyn the prices will be: Stove and chestnut, $7.75; egg and broken, $7.50, pea or No. 2 nut, $7, and buckwheat, $6.50.

Why Success in Accident Reduction Lags

Despite all our missionary work, the loss of life and the disabilities caused by accidents every year are staggering. According to statistics, fatal accidents to workers number more than 40,000 annually, while the number of injuries runs into the millions. No doubt the number of accidents will be considerably reduced in the United States, as it has been reduced in Europe, by preventive measures; but when all has been said and done, the appalling waste of lives mentioned is to a great extent unavoidable, and modern industry will continue to exact a fearful tribute of life and limb.

In the first place, the danger inherent in the methods pursued in present-day industry is a prime contributing factor to the high mortality rate. Modern manufacturing makes use of a number of subtle forces whose powers of destruction, when not under control, are fully commensurate with their power for service when properly subjugated.

Furthermore, these forces operate complicated machinery which the individual workman can neither understand nor control, but to the operation of which his own motion must conform in the number of pieces turned out, the quality of work produced, etc.

And then, again, the workman does not have an opportunity of supervising that part of the work by which his life and limb may be imperiled. There are so many operations combined in the turning out of a certain piece of machinery, the successful completion of which is dependent upon hundreds of operatives and different tools, that the slightest defect in one minor part or the carelessness or inattention of a single individual may put in jeopardy the lives of hundreds.

A tired and sleepy switchman pulls the wrong lever, and a passenger train crashes into a freight train on a siding. A fireboss fails to properly examine a mine for gas, and an explosion wipes out a score of lives. A steel beam fails to withstand the pressure it was supposed to bear, and a building collapses, burying a small army of workmen in the ruins.

In the second place, the worker of the present day is not sufficiently far removed from his ancestor of yesterday, who knew nothing whatever about machinery, to be perfectly fitted for the strain put upon him by mechanical industry. To safely perform the work required of him, the operative in a mill, a mine or a factory should be an automaton. He should be able to respond to the most diverse mechanical requirements and should be as insensible to fatigue and as unvarying in behavior as the machines which he is required to operate.

Normal human beings are not machines. Every physical act performed by man is the result of some mental process, and the greater the amount of skill called for the greater the mental process that precedes the effort.

Speeding-up processes that require the worker to force himself constantly on and on, and arduous work that under the temptation of a bonus system or an above-the-scale rate of pay is carried on for hours beyond the logical work-day and the strength of the worker, result in fatigue, overcome him, diminish his nervous energy and trebly enhance his liability to accident.

The introduction of machinery, of scientific management, of standardization of operation, and kindred innovations, is of such recent occurrence that it has not yet resulted in a mechanically standardized race, if it ever will; and in spite of machinery safeguards, precautions and safety-first propaganda, the long list of fatalities—like the poor—is ever with us.

British Miners and Military Service

The British Government's Home Secretary announced last November that the Government was faced with the problem of obtaining an additional 15,000,000 tons of coal a year over and above the then existing rate of output, and that all persons who were employed in the coal-mining industry, excepting any men who might have gone into the mines since June 24 last, would be exempt from military service. There are many thousands of young men less than 18 years old who yearly pass that age, and in the ordinary course of events these would join the forces; but they are a fine type of miner, young, enthusiastic and proud of the fact that they can do a man's work. It will be a great relief to mine owners to know that their services will be retained.

The number of men who have slipped into the mines from other occupations is not large, and therefore the loss of those who have joined since June 24, 1916, will not be seriously felt. They were not all slackers, for some were engaged on the brick-making plants in connection with different mines and others were builders, laborers, farm hands and the like.

The real trouble at present is absenteeism. The percentage mentioned by the Prime Minister is 9.9 per cent., which is the figure for the North Staffordshire and South Wales districts. After deducting 5 per cent. for legitimate cases of illness, it follows that the remaining 4.9 per cent. are absent through sheer indifference and callous neglect of the importance of their services to the country. If the vital need of their working at full pressure could be brought home to them, the problem of raising the additional 15,000,000 tons per annum would be solved. It is not right that the men should shelter themselves under a badge and then only work three or four days a week instead of six.

The only alternative to exempting those in the coal mines would be to increase the hours of labor above the

present period of eight hours a day. It has been calculated that the addition of one hour to the present working day would mean an increased output of 12½ per cent., which is about equal to the 15,000,000 tons of coal per annum required. But so great is the demand for coal, and so necessary the keeping of a little surplus supply, that a two hours' addition to the working day is what is really needed. The extension of the working day, however, is too big a problem to be attempted at this time, and it must be remembered that about 250,000 miners have joined the forces. The whole pity is that their fellow-miners cannot see the necessity of doing their utmost to back up those in the firing line with coal for the manufacture of munitions and the coaling of warships and other vessels.

Preparedness Census of Technical Men

At the request of the Council of National Defense, the Bureau of Mines, Department of the Interior, has undertaken a census of mining engineers, metallurgists and chemists, with the view of ascertaining the qualifications of each and the kind of work in which each could be of most service to the country in time of emergency. This work is being conducted in coöperation with the American Institute of Mining Engineers and the American Chemical Society. Circular letters are being sent to about 10,000 chemists who are members of the American Chemical Society and 5000 to mining engineers and metallurgists who are members of the American Institute of Mining Engineers.

While there are a large number of mining engineers and chemists who are not members of either of these societies, an effort will be made to obtain as complete a list of these as possible. This will be done by circularizing 4500 metal-mine operators and 4000 coal-mine operators, asking that they furnish the names of mining engineers, chemists and metallurgists in their employ. These names will be checked against the list of the two societies named, and those whose names do not appear as members of the societies will be sent a special letter asking that they furnish the bureau with a record of their experience.

The results to be obtained by this census may be briefly stated as follows: It will make available for use a classified list of chemists, mining engineers and metallurgists. The classification will embrace 27 specific groups of industrial chemists, as explosives, sanitation, foods, dyestuffs, coal, petroleum, fats and soap, sugar, etc. The mining engineers will be divided into 16 groups of engineering work, as for example, engineers familiar with machinery construction, building construction, dredging, drainage and pumping, underground mining, shaft sinking under compressed air, etc.

By such a minute classification, the bureau will be in a position to furnish on short notice the names of specialists, as for example, alloy metallurgists, food chemists, coal or iron mining engineers, or specialists in any branch of the mineral industry, so that in case of necessity these technical men could be placed in industrial plants where they would be of the most assistance to the country. Experience in foreign countries has shown that the technical men were able to render vastly greater assistance by being placed in the factories than in the regular army.

In addition to the technical classification, there will also be a classification of engineers, metallurgists and chemists according to their experience in foreign countries and languages with which they are familiar.

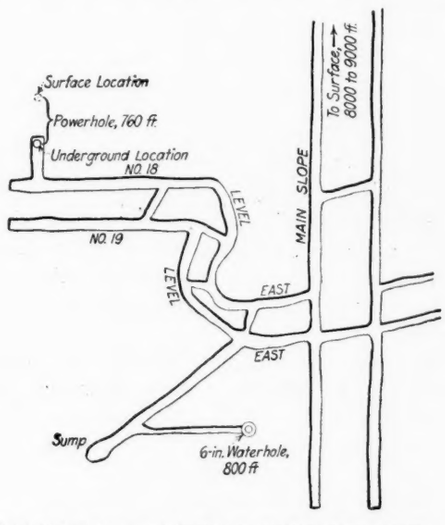
It is hoped that as a patriotic duty each engineer, metallurgist and chemist receiving these cards will furnish the information promptly in order that the bureau may complete its work with the least possible delay. Complying with these requests in no way obligates the person who signs it, but has the advantage that in case of need he can be placed where his efforts will yield the best results. Chemists, engineers and metallurgists are indispensable in any present-day warfare, and their services must be conserved to the best interests of the nation.

Luck and Accuracy in Borenole Location

By L. Netland

During the years 1911 to 1915, when the development work of the Canadian Collieries Co. at its Comol Mines was in progress, several interesting engineering problems were encountered. At the Comol No. 4 mine the workings had advanced so far from the mouth of the slope that the problem of getting rid of the water in the mine became a serious one, both on account of the distance and the acidity of the water, which corroded the pipes to such extent that continuous repairs were necessary.

In the summer of 1912, before the great strike, and during the most active part of the development, one of



LOCATION OF BOREHOLE WITH RESPECT TO UNDERGROUND WORKINGS

the diamond drills started a "bore" just ahead of the workings and went to a depth of some 500 ft. when, owing to the strike, the drill had to shut down. Considerable difficulty was experienced in reaching the bed rock, about 170 ft. from the surface, owing to loose gravel, boulders and quicksand, but this was overcome by cementing.

After the hydro-electric plant was finished in 1913, and all the mines electrified, it was decided to continue this bore to the lower seam workings and use it as a "short cut" for a power cable to the pumps, coal-cutting machines, etc. It was also decided to drill a 10-in. hole near the present one and use it for pumping out the water from the lower levels of the mine. The location of the diamond bore, according to our surveys, should strike in a solid body of coal some 90 ft. above Nos. 18 and 19

SURFACE PLANT AT NO. 5 MINE

A SIX-ROOM MINER'S COTTAGE

levels, east of the main slope. The location of the water-hole was also more or less fixed, as it was intended to strike the lowest spot in that part of the mine; it was thus located (on paper) when I received orders to make the surveys to drive a place into the holes underground.

I had made surface surveys several years before connecting the different bores and the pit mouth, but these were not deemed sufficiently accurate for the present purpose. The underground surveys had also been carefully made, by different men at different times, but these were also rejected and new surveys made, connecting up with the old ones, wherever points could be found. Similar

GOVERNMENT ROAD THROUGH HEAVY TIMBER

surveys were also made on the surface over rough and irregular ground, through heavy timber and underbrush, a distance of about 2½ miles. Computations were then made for the closing courses to be laid off underground.

The distance between the holes on the surface was about 500 ft.; underground the distance was twice that much, owing to the crooked entries, and there were many very short sights. Following the entries was finally abandoned and new entries were laid off and driven by sights to meet bores. After driving these entries to opposite the power hole, a right angle was turned and driving toward the pipe hole commenced.

Our computed distance to the pipe on this course was about 96 ft., but we struck the pipe 34 ft. from the entry, or 62 ft. short. Of course, the object was attained, but it did not speak well for our surveys. The line of sight passed within 1 ft. of the pipe, but our hope that locating this hole first would give us a check on the location of the water hole was blasted.

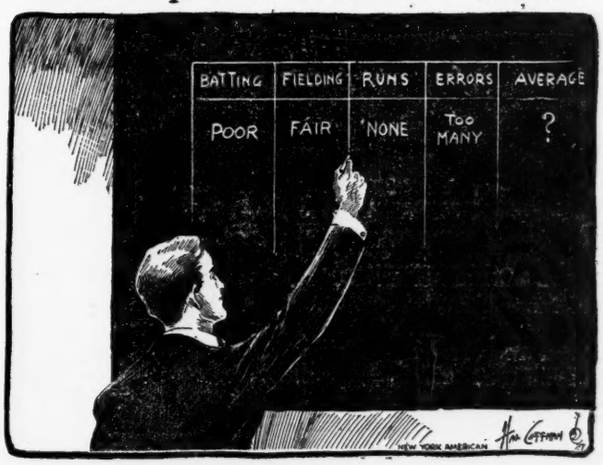
Investigations showed that the pipe had a slant of nearly 4 in. in 4 ft., the distance between the roof and the floor. While it was not exactly in the same plane as the line of sight, it was very close; and if the 4-in. inclination continued uniform to the surface, our surveys were correct.

No alterations were made in the original surveys and driving toward the water hole was continued as originally laid out. The distance to be driven was about 130 ft. and the width only 8 ft. As this hole had been drilled with a Keystone driller, we believed it near vertical.

As the drifting progressed there was considerable interest among the managers and foremen, who several times reported the full distance was driven and no pipe in sight; but our investigations always found them still a little short. Finally, when I was satisfied the pipe should be in sight, I sent an assistant underground and then went to the bore on the surface and let down a heavy piece of iron on a wire to the bottom of the hole. A shot was distinctly heard as the iron was lowered and, at the appointed time, the iron was raised and dropped several times. The assistant underground heard it distinctly, and reaching in with his hand in the blowout from the shot felt the pipe. It was 1 ft. to one side and about 2 ft. ahead of the computed place.

While we did not expect the diamond drill holes to be perfectly vertical, we had reason to believe they were much closer to the vertical than this case indicated. However, our surveys were vindicated.

Ever Keep a Box Score of Yourself?



WHAT'S YOUR BATTING AND FIELDING AVERAGE IN THE GAME OF LIFE?

New Apparatus and Equipment

New Gathering Pump

The pump shown in the accompanying drawing has been placed on the market by the Fairmont Mining Machinery Co., of Fairmont, W. Va. This machine, known as a No. 5 gathering pump, is similar to the type that has been built by this company for some time, except that it is larger. This pump is provided with a 3-in. suction and 2-in. discharge, and is designed to handle 100 gal. of water a minute against a head of 100 ft.

This machine is the result of years of experience in pump building and embodies many features that insure its effectiveness and reliability. It is of the outside packed plunger type, but if this type is not desired, the entire water end may be removed and a piston type of water end substituted.

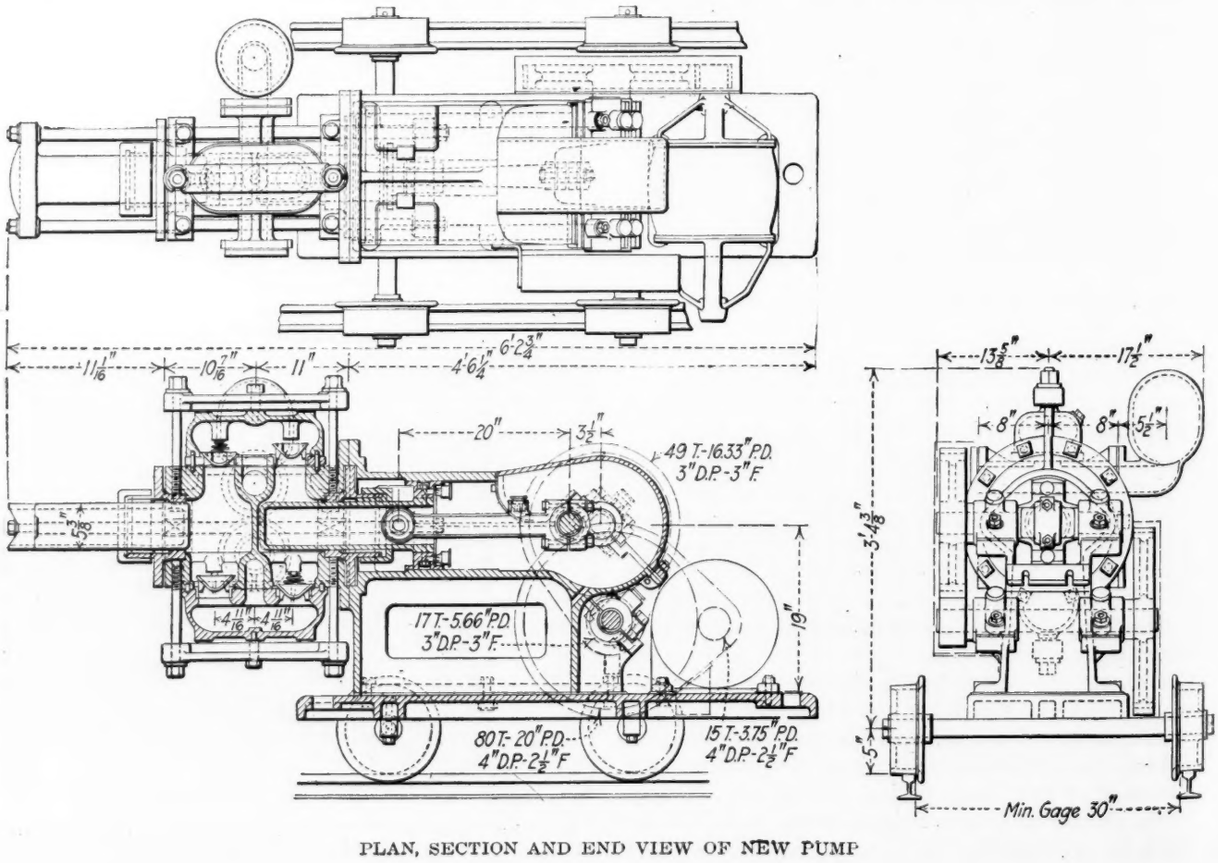
The pump is compact, allowing of a minimum track gage of 30 in., and a minimum height of 41 in. All moving parts, except the plunger, are entirely inclosed. The glands are removable, and the gland fastenings are so designed that the glands themselves cannot be improperly aligned.

The pump is provided with stemless bronze valves working on beveled seats. These seats are pressed into place, being provided with a taper fit. This obviates the difficulty sometimes encountered with screwed seats working loose and allowing excessive leakage. The suction valves are seated in the valve cap plate, while the discharge valve seats are in a removable plate held between the cap and the cylinder casting.

The valve caps are held by a yoke, the point of contact between yoke and valve cap being a pivoted stud, upon which the yoke is free to rotate. This type of fastening is of great advantage when access to the valves for inspection or repair is desirable.

The pump is designed throughout for grease lubrication, with grease cups protected by housings. If oil lubrication is desired, the grease cups may simply be removed. The protecting housing then becomes a waste chamber if the use of waste is desired.

All bearings are die cast. They may consequently be removed without disconnecting the pump from either suction or discharge line. Perfect alignment of the shafts and bearings is secured by this die casting. Where the bearings in a pump of this kind are of babbitt or other bearing metal cast in place, they are often allowed to wear down for a considerable distance before repairs are attempted. With the die-cast bearings, on the other hand, the replacement of a worn bearing is a matter of only a few minutes' time, and the pump is consequently much more likely to be kept in good repair than where a new bearing must be cast in place. By this means one man is



PLAN, SECTION AND END VIEW OF NEW PUMP

enabled to carry all the bearings necessary for the pump with him into the mine and put them in place without disturbing the pump connections, which is a decided advantage over the necessity of breaking connections and transporting the pump to some point where babbitt may be safely melted and poured.

The pump may be driven by either direct or alternating-current motors of any standard characteristics. Reduction of speed between the motor shaft and crankshaft is accomplished by two sets of cut spur gears. These are, of course, properly protected by suitable housings, adding greatly to the safety of the pump operator.

An Improved Coal Drill

The Howells Mining Drill Co., of Plymouth, Penn., has been making rotary drills, both hand and power driven, for many years, and its product, in a general way, is well known to the coal-mining industry. This firm, however, has recently introduced two improvements that increase the range of usefulness of its power-driven machines.

Fig. 1 shows a new type of Spry electric rotary drill mounted on a tripod. This drill, which is so arranged as to swivel or turn in all directions, making it suitable for drilling holes vertical, horizontal or inclined at any angle, is driven by either a direct- or alternating-current motor of any desired voltage. Thus the machine is particularly adapted to strip pits operated electrically, as well as for use in those mines employing electricity underground.

Mounting one of these drills on an ordinary tripod has many advantages, in the way of portability or quickness in making a set-up, over post mounting. The former method, however, has one disadvantage, which in this case has been largely overcome. It will be appreciated readily that the feed screw, in forcing the auger into the material to be drilled, exerts an equal action on the machine, tending to force it away from the face. In this machine, where the coal is hard and the drill tripod would tend to turn over, a shallow pilot hole is first drilled into which a coarse-threaded tapering eye-bolt is screwed. This is then attached to the tripod by means of a chain. This arrangement effectually prevents any tendency of the machine to upset. For vertical holes, the same means would prevent a lifting of the tripod off its feet. The eye-bolt and chain enable this drill to operate in any rock that can be drilled with a rotary bit.

The other improvement is shown in Figs. 2 and 3 and consists in the compound back gearing of the auger. For ordinary work, such as drilling shotholes in clean coal, a simple back gearing between the motor and the drill is

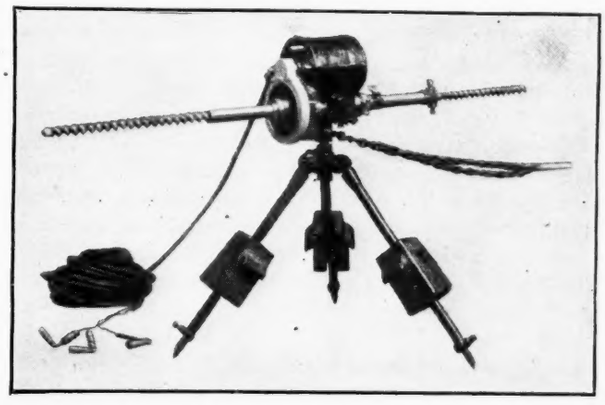
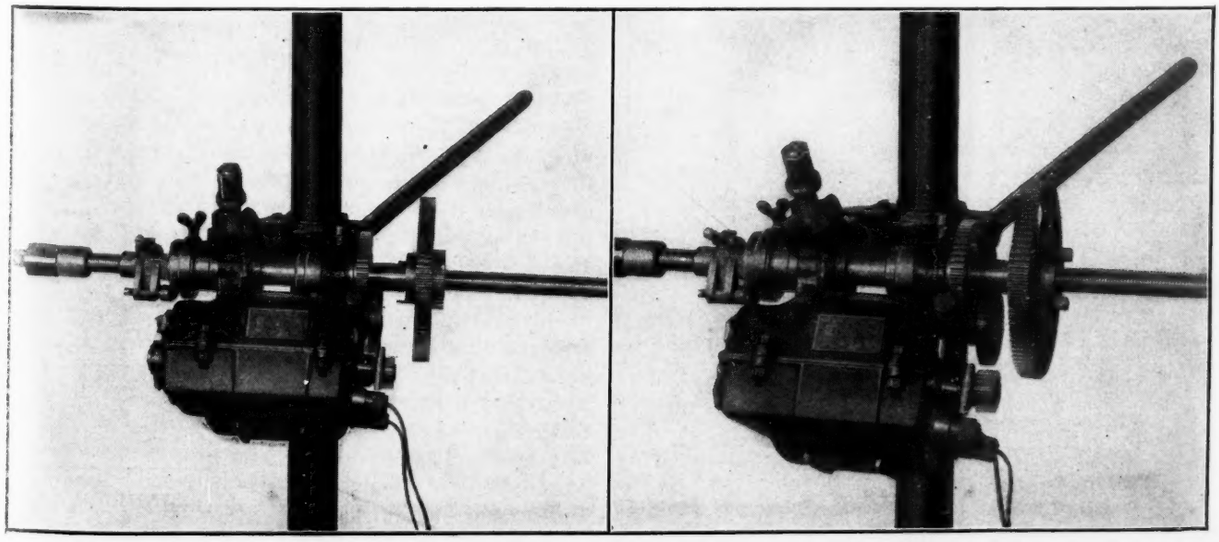


FIG. 1. SPRY DRILL ON TRIPOD

all the speed reduction that is required. If bone is encountered, however, or if it is desired to use the machine in drilling rock too hard for this speed, simply removing the main back gear and turning it end for end compounds the machine so that the auger, instead of making 400 r.p.m., makes only 120 r.p.m., while the motor develops its maximum power.

This simple device, which may be secured as an attachment to drills already in use, renders it possible to drill, with a machine intended for boring shotholes in coal, any rock that can be bored successfully by means of any rotary auger bit. Those experienced in coal mining will readily appreciate the advantage thus secured. By the aid of this back gear a drill intended originally for drilling coal may, in many instances, be employed for taking down roof, lifting floor, etc. The range of usefulness of the machine is thus greatly increased.



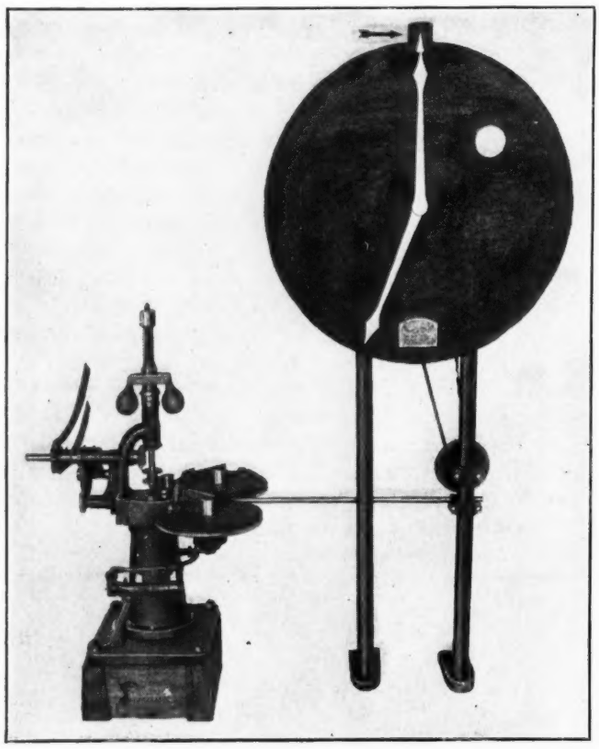
FIGS. 2 AND 3. SHOWING METHOD OF COMPOUND BACK GEARING THE DRILL

Roybel Emergency Governor for Keyed Double-Drum Hoists

For some years past, Royer & Zweibel, of Wilkes-Barre, Penn., have been building an emergency governor for mine hoists. This machine is designed to prevent overwinding, overspeeding, starting in the reverse direction, etc., as well as to give the hoistman a visual signal at each dump, showing which cage is to be hoisted. The device as originally designed was applicable to hoists fitted with one tight and one loose drum. It carried two indicator dials.

Within the past few months, this firm has introduced an improved emergency governor. In the former practice, since one drum was adjustable on the shaft, any inequalities in the length of hoist of the two cages between the bottom of their respective compartments and their dumping positions could be compensated for by shifting the position of the movable drum on the shaft. This is obviously impossible where both drums are keyed to the same shaft.

To overcome this defect a second revolving plate, disk and trip arm have been added. Since each plate carries



KEYED DRUM GOVERNOR

an adjustable inclined stop, this gives absolute control of the travel of each cage above its landing or dumping point. The revolving disks may also be set independently of each other, so that their trip lugs will be in the desired position in relation to their respective trip arms.

The operating valve has also been improved. Formerly a revolving slide valve was employed. This necessitated the hoist operator leaving his station to reset or test the governor. The improvement consists in employing a piston valve, which applies the brakes as did the former machine in case of emergency. The pulling of a rod or cord, however, which is within easy reach of the hoist operator is all that is necessary to test or reset the mechanism. By pulling this cord and holding it, the operator is enabled to hoist the cage past its landing to any desired point.

Another improvement on this machine is a visual indication of the signals received. This operates as follows: Two openings are made in the face of the dial. These are shuttered by banners that operate from the various landings in conjunction with bell or whistle signals. In the accompanying illustration one of these openings shows a white and the other a red banner. When the cage comes within 6 ft. of the landing, the banner behind the dial is automatically moved to show the red banner. When the signal is given from the top landing, the banner (operated by either air or electricity) drops and shows white, the other banner remaining red until a signal is given from any one of the lower landings, when a white banner appears bearing the number of the level from which the signal is given. By this means confusion arising from repeated signals is prevented.

The success of these devices may in a considerable measure be judged from the number of repeat orders the manufacturers receive from their customers. One large firm in the anthracite region has purchased six of these machines, another has purchased four and another two. All three companies made careful and thorough tests of these governors and are satisfied with the protection they afford. Many repeat orders are also received from various engine builders. Among these might be mentioned specifically the Ottumwa Iron Works and the Wellman-Seaver-Morgan Co. For this latter firm ten governors are now being built to be used on electric hoists designed for deep shafts, the travel of the cages being about 5000 feet.

The Elwood Jigometer

The accompanying illustration shows the Elwood jigometer which was designed and patented by W. F. Elwood, chemical engineer, of Greensburg, Penn. The Elwood jigometer, it is claimed, solves the most perplexing phase of coal washing in that it registers the maximum and minimum bed required for the highest efficiency of the jigs; the maximum amount of refuse that may be permitted to collect in the reservoir below the screen before flushing the jigs; the depth to which the jigs should be flushed; the position of the water; the clearing ability of the screens and the efficiency of the jig plungers. It is claimed that the merits of this instrument have been thoroughly proved. As is well known, a jig is a difficult machine to operate efficiently by guesswork. In any machine where successful operation depends on the balancing of as many variable factors as are involved in coal washing, a simple and accurate indicator for all of these factors should prove highly advantageous in the operation of washeries.

THE JIGOMETER

Development in Safety Lamps

By James Ashworth*

SYNOPSIS—The three prominent features of safety lamps that have been closely studied by all investigators. Early types of lamps embody essential features that still characterize the most approved lamps, today. Qualities of good testing lamps. Means of detecting small percentages of gas in the mine air. High illuminating power a quality of working lamps.

Probably there is no feature connected with the coal-mining industry that better illustrates the ultimate success of untiring efforts than that exhibited by the present approved types of safety lamps. Ever since Sir Humphry Davy announced to the world, Dec. 15, 1815, his discovery of the power of wire gauze to isolate a lamp flame from the surrounding atmosphere, the safety lamp has received the closest study by investigators who have devoted their chief attention to its three more salient features; namely, its power to isolate the flame within, its ability to reveal the presence of small percentages of gas in the air, and its illuminating capacity or candle power.

It was quickly realized by careful investigators and lamp manufacturers that all these features, and others, such as the weight and portability of the lamp, its size and cost of manufacture, were all closely associated with its form and the material employed in its construction.

Among the early types of safety lamps that have successfully withstood the advance of time is the simple unbonneted "Davy," so called from its illustrious inventor. The most prominent feature of the Davy lamp is the small resistance offered by its chimney to the inflow and outflow of the air surrounding the lamp. In this respect it is in direct conflict with the main feature that characterizes the Stephenson lamp and forms an important feature of many of the later types of safety lamps. The feature to which I refer here is the restriction of the circulation within the lamp by reducing the size of the openings admitting the air to the combustion chamber, and by protecting the upper portion of the lamp chimney by a shield or bonnet.

Dangerous Feature of Some Lamps

It was quickly found that too large a gauze might render the use of the lamp dangerous in a highly explosive firedamp mixture. Examples of this are to be found in the Pieler and the Chesneau lamps, both of which burn alcohol that gives a much greater height of flame cap than is common with the nonvolatile oils. This fact makes these lamps unsafe in a firedamp mixture, owing to the ease with which the chimney fills with flame when the lamp is exposed to gas.

In order to restrict the circulation within the lamp George Stephenson inserted a glass cylinder within the gauze of the Davy lamp and provided small tubular openings below the flame for the admission of air. The glass cylinder was surmounted by a copper cap provided with small perforations, which restricted the outflow of the burnt air and gases at the top of the chimney. The miners gave this lamp the name of the "Geordie" lamp and this is yet quite a favorite with many firebosses.

Doctor Clanny was the first to improve the lighting power of safety lamps by surrounding the flame with a short glass cylinder surmounted by a wire-gauze chimney. The lamp admitted the air through the lower portion of the gauze just above the glass. The descending and ascending currents thus formed in the combustion chamber caused the lamp to smoke easily. The early prejudice of the miners against the glass, because of its liability to be broken, has been largely overcome and, today, the "Clanny" is a favorite type of working lamp.

In the study of lamps for testing gas it was found that one of the essential qualities of such lamps is a nonluminous flame; and this quality accompanied, in my opinion, with the heat of the flame, offers the best condition for detecting small percentages of gas present in the air. The Ashworth alcohol lamp, having three round wick burners; the Ashworth-Clowes lamp, burning both oil and hydrogen; the Ashworth-Stokes lamp, burning both oil and alcohol, and the various types of safety lamps now manufactured and designed to burn benzine-naphtha, of which the Wolf lamp was the original representative, are all of the Clanny type. Naphtha lamps are now manufactured by the American Safety Lamp and Mine Supply Co., Scranton, Penn., and others.

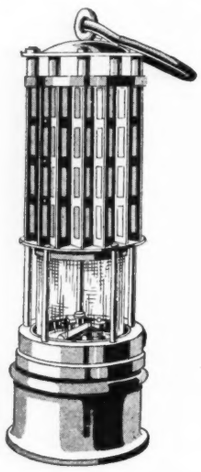
Stephenson Principle Still Recognized

It is interesting to note in passing an old axiom that came to be recognized by all successful lampmen. It was that "a safe safety lamp must have both its inlet and outlet openings restricted." This is a prominent feature of present day lamps of high illuminating power. Another important feature of these lamps and one that affords increased protection at the top of the chimney is the inner metal bonnet surmounted by a truncated cone. Still another feature that adds to the protection of the lamp and increases the illuminating power by the concentration of the heat in the combustion chamber is the conical glass. Both of these features originated in the Ashworth-Gray lamp, a type of which was later styled the Ashworth-Hepplewhite-Gray lamp.

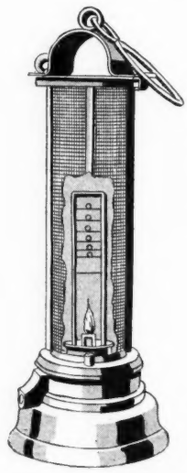
Attempts have been made to overcome the difficulty experienced by many firebosses who are unable to detect the presence of gas by the flame cap when less than 2½ or 3 per cent. of gas is present. Owing to this failure of firebosses to detect smaller percentages of gas in the mine air, miners have frequently been unwarned of impending danger and avoidable explosions have occurred.

In the most successful of these attempts to enable the detection of small percentages of gas, advantage has been taken of the power of platinum wire to absorb gas and incandesce when heated. A simple device of this nature is found in the Beard-Mackie sight indicator for gas, designed for use in the unbonneted Davy lamp. The indicator consists of a number of strands of platinum wire mounted on a support above the flame of the lamp. The successive incandescence of the looped wires indicates percentages of gas present in the air as follows: ½, 1, 1½, 2, 2½ and 3 per cent. The device is manufactured by the American Safety Lamp Co., Scranton, Penn.

*Mining Engineer and Inventor of some types of safety lamps, Vancouver, B. C., Canada.

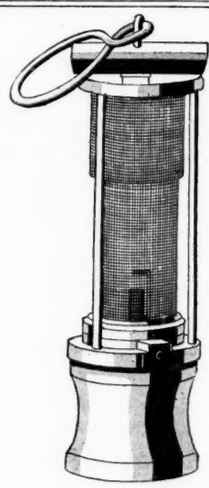


WOLF (NAPHTHA) LAMP

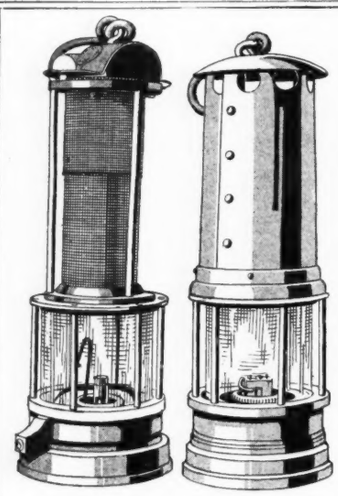


DAVY LAMP with SIGHT INDICATOR

BEARD-MACKIE SIGHT INDICATOR for DETECTING GAS



FIREBOSS DAVY LAMP

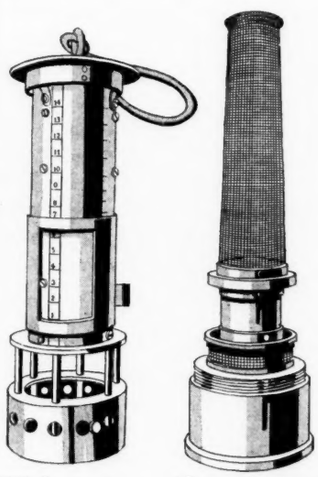


(Unbonneted) (Bonneted)

CLANNY LAMP

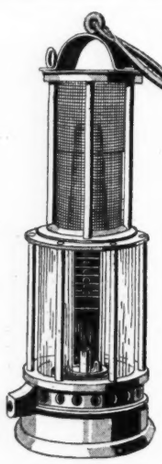
SIR HUMPHRY DAVY

Discoverer of the Isolation of Lamp Flame by Wire Gauze

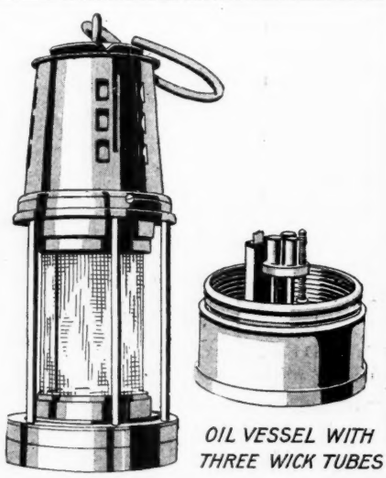


(With Bonnet) (Bonnet Removed)

CHESNEAU (ALCOHOL) LAMP



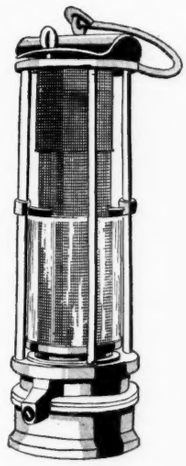
UNBONNETED BEARD DEPUTY LAMP WITH INDICATOR



OIL VESSEL WITH THREE WICK TUBES

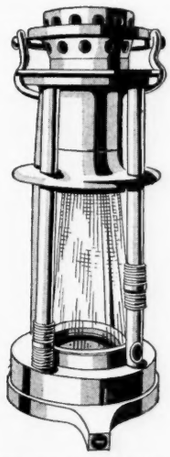
ASHWORTH (BENZOLENE) LAMP

CAMBRIAN LAMP

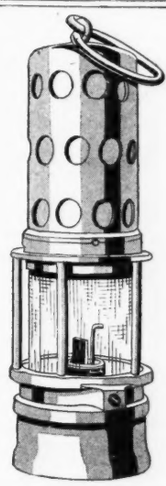


HUGHES DAVY LAMP
with SLIDING GAS SHIELD

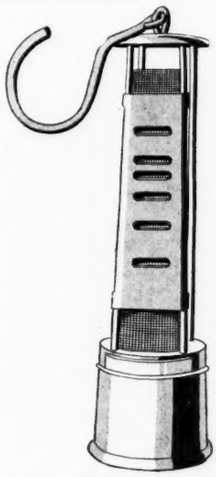
OIL VESSEL with
ALCOHOL VESSEL
inserted from below



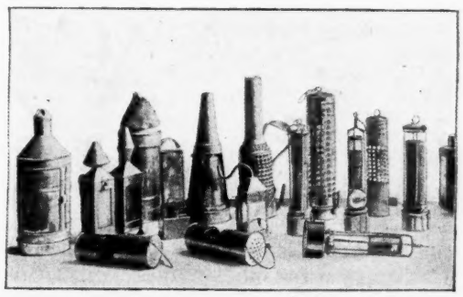
STOKES (OIL ALCOHOL) LAMP
Ashworth Pattern



HUGHES BONNETED CLANNY

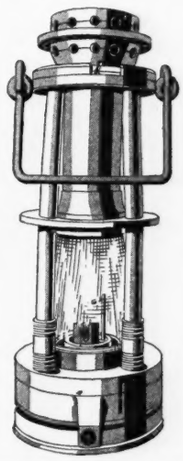


PIELER (ALCOHOL) LAMP

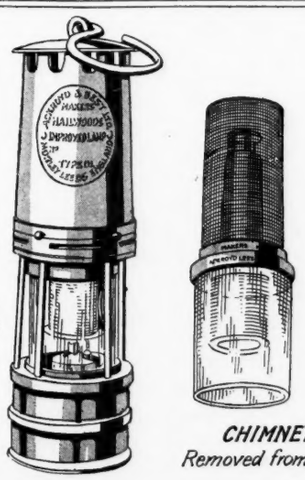


PART OF HISTORICAL COLLECTION
showing EARLY TYPES OF SAFETY LAMPS

Royal Institution,
London, England.

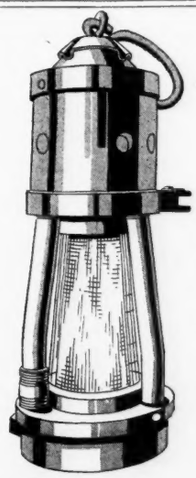


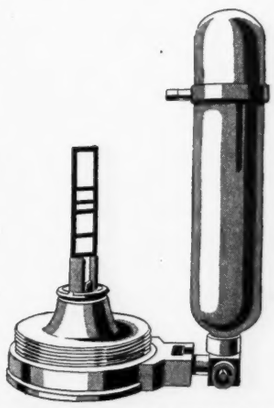
ASHWORTH-HEPPLEWHITE-
GRAY LAMP



CHIMNEY
Removed from Lamp

THE HAILWOOD
COMBUSTION-TUBE LAMP





OIL VESSEL & HYDROGEN CYLINDER
Removed from Lamp

CLOWES (OIL-HYDROGEN) LAMP
Ashworth Pattern

More recently, owing to the fact that the large percentage of accidents that have occurred in the use of safety lamps can be attributed to insufficient lighting, which makes it difficult for the miner to detect danger in the roof of his working place, many attempts have been made to improve the illuminating power of mine lamps.

Electric Mine Lamps vs. Safety Lamps

The introduction of electric lamps into the mine, within the past few years, has greatly stimulated efforts to produce high-powered safety lamps. The chief objection to electric mine lamps is their inability to detect the presence of gas and forewarn the miner of his danger from that cause. From the earliest time, miners have been able to rely on the indications of the flame of their lamp to give them warning of danger from gas.

Lamps of the Ashworth-Gray pattern have been recently brought to a standard of 1¼ cp. The Hailwood combustion-tube lamp, recently placed on the market, gives a light equal to 1½ standard sperm candles. I understand this lamp has proved so successful as to displace electric lamps in several instances in the mines.

Another high-powered safety lamp is that manufactured by E. Thomas & Williams, Aberdare, England. This lamp is said to give 1½ cp. at the end of an 8-hour shift. It makes use of one of the earlier features of safety lamps, consisting of an interior tube mounted above the flame, which greatly increases the upward draft, making the combustion more complete and improving the light.

Devices Employed To Improve the Light

Both the Hailwood and the Thomas & Williams lamps employ this inner chimney to increase the draft in the combustion chamber of the lamp. The Hailwood lamp also uses a porcelain burner, which tends to keep the oil vessel cooler than when a metal burner is used and, moreover, serves as a reflector that improves the light.

The particular feature that has improved the illuminating power of the Ashworth-Gray lamp is a semicircular cut made in the center of the top of the ⅝-in. wick tube, as shown in the accompanying cut. This simple artifice has the effect of producing a rounder and less smoky flame, besides giving a hotter flame when the latter is reduced, in testing for gas. The illuminating power of a safety lamp is greatly influenced by the way in which the air supply is brought into contact with the flame and the volume of air supplied to the combustion chamber of the lamp. The light-giving power of the flame is also increased by the use of duplex wick tubes, round or flat, or triplex round wick tubes. Tin or aluminum tubes produce a better light than either brass or copper, and porcelain is far better than any metal, in this respect.

Increased light does not mean an increased cost in oil. Petroleum having a high flashing point, such as mineral colza oil, is probably best adapted for use in high-powered lamps. These recent developments in safety lamps make them far superior, in my opinion, to any electric mine lamps that have yet been produced, for the reason that electric lamps possess no power to show the presence of gas in the mine air.

[The lamps shown on the two preceding pages include many of the most approved types of safety lamps, grouped about interesting historical centerpieces.—Editor.]

Success

SEE that all promises are kept; that no promise is made that should be broken.

USE the knowledge you have to obtain the knowledge you ought to have.

COUNT the value of little things; you can't love a dollar and despise a dime.

CONSIDER yourself a plaintiff before the bar of your mind; in self-judgment neither give nor expect leniency.

ENDEAVOR to make friends your most prized possessions, after your family; know that people are greater than things, that their opinions are better than books.

SURRENDER your vices — keep your body and mind fit; don't worry; make your failures stepping-stones to achievement; if you fall, fight on your knees.

SAY to yourself every day: Self-respect is greater than the esteem of men, wealth of the soul is more than the wealth of the Indies.

A Premium on Unpreparedness

A large retail dealer several months ago decided to increase his storage space at an expenditure of $5000, but he is now on the verge of abandoning the plan. He is doing this because during the most active part of the past winter his competitors pointed out to shippers his large storage stocks and urged that shipments to him could be curtailed easily to their own benefit. Owing to the meager shipments received, he feels that he was made to suffer for his foresight and expenditure.

The Labor Situation

General Labor Review

One hundred irresponsible breaker boys at the Coal Brook breaker at Carbondale walked out on Mar. 29 for an increase of 2c. an hour. Perhaps one should not blame the boys. They are too young to know the value of their word, the meaning of a contract or the injury they are doing to their elders, whom they are laying idle.

They have had their demands before the officials for several weeks; they "warned" them, in short, that they were going to break their contract if the operating company would not submit; and being duly warned, of course, that the boys were going to violate their pledge, the company could expect nothing else, and noncombatant miners must take the consequences. The officials have refused to pay the increase and they claim they can work the breaker without the boys. Should the breaker be laid idle, 1500 employees would be thrown out of work.

"I Won't Works" Demand "The Three Fives"

The home of the Industrial Workers of the World is in the towns between Wilkes-Barre and Scranton, with Dupont the inner sanctum. Sheriff Buss of Luzerne County has warned the owners of halls not to permit any meetings of this antisocial body to be held in the village of Dupont. A meeting was said to have been scheduled for the night of Mar. 29, Yonish's hall being the place chosen.

I. W. W. leaders are making an extensive canvass for new members. They hope on Monday, Apr. 9, to arrange a general strike as a protest against a declaration of war by Congress. Troop B of the State Constabulary and the sheriffs of Luzerne and Lackawanna Counties are making arrangements to prevent disturbances. The slogan of the new attempt to secure members is briefly summed up in the catch words "Three fives," meaning "Five hours a day, five days a week and five dollars a day."

Central Pennsylvania Seeks One-Third Raise

In central Pennsylvania interest centers around the special convention held at Du Bois in defiance of the wishes of the United Mine Workers' leaders and continued despite their opposition. Central Pennsylvania now has what the rest of the unionized mine workers would be well pleased to receive. It has had this increase since the first of the year, but the concession seems only to have whetted the cupidity of the mine worker. "Ten per cent. nothing," he declares; "I want 33⅓ per cent."

President J. P. White's telegram of Mar. 26, addressed to the convention, was as follows: "Please extend to officers and delegates in special convention my sincere regards. I express the hope that all factional differences will be laid aside and that whatever action your convention may take on the matters for which it was convened will reflect great credit on the delegates assembled. Above all, I hope your convention will go on record for the maintenance of your joint agreement. Have advised Secretary Green to be with you."

Board Tried To Negotiate Without Convention

From the report of acting President O'Neill, it appeared that when South Fork local No. 462 asked for a special convention, and 60 other locals signed the request, the district executive board of the United Mine Workers wrote to the Operators' Association of Central Pennsylvania, and the association promptly gave a 10 per cent. bonus; but the men were not satisfied and demanded a convention looking for the further holding of a conference with the operators' association.

In reply to a second communication, B. M. Clark, the president of the operators' association, urged the leaders of the district not to call a convention, saying that while they had power to call it yet, under the rules, they were not compelled to take such action. Sec. 1, Art. 9 of the constitution of District No. 2 states that "Special conventions may be called by the president when so instructed by the executive board or at the request of 20 or more local unions."

Mr. Clark further stated in his reply that the bonus and the voluntary increase given to day laborers had added $400,000 to $500,000 to the monthly wage scale. He could not offer therefore any hope that the operators would grant a special conference. The mine workers' executive board then proposed a referendum, but finally decided to call the convention, and made another vain appeal to Mr. Clark.

But to return to the convention—on the second day, Mar. 27, the session lasted only two hours, the delegates delaying matters in order to give the policy committee time to consider matters and report. That committee elected James Mark, of Du Bois, as chairman and E. D. Swartzentruver, of the aggressive South Fork local, as secretary. But though the session was short, it sufficed for the reading of the report of the secretary-treasurer, a document which must have dampened the ardor of the delegates. It makes it perfectly obvious that the district as a whole cannot strike without the support of other districts; and that, with the stand of the executive board against such a strike, it simply cannot occur.

The other districts will not subsidize central Pennsylvania in a strike to get a further bonus, for they themselves have received no bonus at all; and they do not ask any larger bonus than central Pennsylvania already possesses. The whole attitude of the Du Bois men is unreasonable.

Could Not Buy Poke of Tobacco per Member

The secretary's report showed that the total receipts for the year were $501,111.26 and the total expenditures $615,108.37. Thus the loss during the year was $113,997.11. This left a balance at the end of December of $44,625.75, whereas at the beginning of the year the balance had been $158,622.86.

Relying on its own accumulated funds not even the wealthy Illinois district would be able to face a general strike. No district can prosper in such a general suspension without the good will of the other districts. The central Pennsylvania district at the beginning of the year had an accumulated surplus of only about $1 a member, which would recompense the mine worker for only two or three hours of idleness, for there were on Dec. 1, 1916, 40,815 members to spend the $44,625.75. The funds have been decreasing $13,000 a month, so now there is hardly enough money to buy a packet of tobacco for every member of the district union. And the convention is rapidly spending that.

Numbers Increase, but Funds Decrease

The number of members increased 3231 in the twelve months covered by the report. There were 30,355 miners and 10,490 daymen at the end of the year, the union miners in the district decreasing by 2763 and the daymen increasing in numbers by 5994. The local unions numbered 177 at the end of last year; 33 new unions were organized and 11 abandoned, making a gain of 22.

The organization was never so large. Never were there more checkweighmen employed. But that condition has its disadvantages, for some of the checkweighmen cannot be wholly supported by the deductions made from the coal of the miners, but are paid partly by union funds.

The secretary stated that, "At the close of the year 370 checkweighmen received wages from this fund as against 307 recorded at the close of the preceding year, or an increase of 63 during this period.

Weighmen at Small Mines Cost Pretty Penny

"There was paid out in wages to checkweighmen $269,570.48 as against $204,810.93 for the previous year, an increase in the maintenance cost of checkweighmen of $64,759.55. Of this number 156 were maintained on nonsupporting tipples at a wage cost of $90,530.50 as compared to 126 employed on nonsupporting tipples during the year previous at a maintenance cost of $64,860.37, showing an increase of 30 checkweighmen on nonsupporting tipples at an increased maintenance cost of $25,670.13."

On the third day the policy committee presented its report, an extremely drastic declaration. The final clauses declare against a strike but they were not accepted by the convention. However, this is not important, as a long strike is unthinkable, for the expenses of the convention are eating up the last dollar in the treasury. The statement of the policy committee was as follows:

We, your policy committee, after carefully examining all resolutions referred to us and having given careful consideration to each and all, respectfully submit the following report:

First—It is clearly evident that, at the last joint conference of miners and operators, when the present existing agreement was entered into, a supplementary agreement was made providing that coal operators in District No. 2 would, within a reasonable length of time, relieve the mine workers of the pushing and handling of cars throughout the mines of this

district by doing this work themselves. The mine workers have patiently waited, earnestly expecting that this understanding would be compiled with.

Up to this time very little effort has been put forth by the operators to comply with this agreement. We, the miners of District No. 2, believe that the time has arrived when this agreement herein referred to regarding the pushing of cars ought to be carried out. We believe the operators should carry out this agreement entered into in good faith without further delay, by arranging to handle the mine cars in all the mines operating in District 2. In order that consideration may be given this important question we deem it absolutely necessary that a joint conference of the miners and operators of No. 2 should be held at as early date as possible. It is only by holding such a meeting that a correct and satisfactory understanding can be reached and only in this manner can this important provision be enforced.

Second—In view of the extraordinary increase in the cost of living a situation, which could not be foretold when the present joint agreement was concluded, it goes without saying that the mine workers are entitled to a substantial increase in mining prices. This increase in mining ought to be sufficient to meet the increasing cost of the necessaries of life. By no other method can the relation of the earning power of the miner with the selling price of coal, which existed at the time when the present agreement was made, be maintained. We, therefore, ask the mine operators of District No. 2 to grant a voluntary increase of 33⅓ per cent over the present existing contract prices and also to all classes of labor employed in and around the mines.

Minor Violations of Contract Are Alleged

Third—It has come to our attention that there are minor violations of contract provisions on the part of coal operators in various parts of the district, due in some instances to neglect and indifference, and in others no doubt because of failure to properly understand all the provisions of the joint agreement.

Fourth—We wish to present to the coal operators a request for a change in that part of Rule 29 which provides that 5 per cent. commission is paid to the coal operators for collection of the check-off at the various mines throughout the district. This is a source of discontent and dissatisfaction among the membership which can be removed without any hardship whatever being inflicted upon the coal operators' association.

For the purpose, therefore, of giving full consideration of all the questions above enumerated, and for the further purpose of giving consideration to the extraordinary situation existing in the coal industry it is of the highest importance that a joint conference of the miners and operators of this district be held without any unnecessary delay. At such a conference a full and free discussion can be entered into; the reason that the prompt action of this convention, as above set forth, can be presented to the coal operators in District 2.

Insist on Inviolability of Contract Made

We believe a complete and thorough understanding can be arrived at, all of which will mean more harmonious relations between the operators and miners. In asking for this conference and for favorable consideration of the questions contained in this statement it is not the purpose of the mine workers to abrogate or set aside the joint agreement existing between the miners and operators, parties thereto. To the contrary we wish to preserve inviolate the contract which we have honorably entered into.

We are convinced this can be accomplished by a joint conference of miners and operators. We recommend that the policy committee, together with the officers of District 2, confer with the operators at once, with a view to arranging a joint conference, as set forth in this statement, at a convenient time and place and at the earliest possible date. We recommend that the policy committee, together with officers of District 2, confer with the operators immediately, with a view to arranging a joint conference, that this convention recess subject to the call of the policy committee and that the policy committee reconvene this convention for the purpose of reporting the result of their conference with the coal operators' association.

Delegates Not So Long on Honor as Committee

All the sections except the last unnumbered section, which states that the contract should be kept inviolate, were adopted. This latter was tabled by a vote of 63 to 45. The first section was only accepted after a lengthy debate.

The delegates were not disposed to go home with this action. They desired to remain till the operators had been compelled to agree to a conference. They were unwilling to return empty-handed to their constituencies, awaiting a call from the policy committee. Secretary Green spoke manfully on the inviolability of the agreement and regretted the tabling of the last clause. He also spoke about the war which was impending, and said that the workmen should stand stiffly by the agreements already made for fear that in the stress of the foreign conflict all the rights they had secured would be swept away on the plea of military necessity. Contracts modified to please one party might later be changed to satisfy another.

Somerset County has been quite peaceful except for the mines of the Grazier Coal Co. near Holsopple. There the mine workers were on strike all last week, demanding an increase of 5c. a ton above the rate in force in all the surrounding mines. They also insist on all union conditions, including the placing of a checkweighman, the collection of the check-off, the restriction of the working day to eight hours with the present nine-hour pay, and the complete recognition of the union.

In District No. 5 the long strike in the Kiskiminetas field has reached its twelfth month and still continues. The mine workers are seeking a union contract. Neither colonization by Southern negroes nor injunctions by the court requiring law and order and protecting those who desire to work have served to break the strike.

The prospect of a conference in the central competitive field steadily improves. Ohio operators in conference have declared for such a meeting and have done even more; they have said they were in favor of an increase in wage if competing districts will also make that concession. The operators of western Pennsylvania later agreed to meet the mine workers in conference if the operators of Ohio, Illinois and Indiana would do so.

On Mar. 29 a few of the representative operators of the four states met in Pittsburgh and agreed to meet with President John P. White and the presidents of the various districts of the central competitive field, the place of meeting to be Indianapolis and the date last Thursday, Apr. 5. This meeting was not called to take final action, but to appoint a place and a date for a joint convention at which decisive action may be secured.

It is not surprising, perhaps, that the central Illinois mine operators are not favorable to any conference. Their margins are perhaps as low as those obtained anywhere. They were summoned to the meeting, but pretended to believe that it would be a waste of time to attend as no concessions were likely to be made.

The attitude of both operators' and mine workers' leaders at this junction should receive much praise. Let them approach the conference with a desire to do their whole duty by each other. The opportunity is excellent for establishing one another in mutual esteem and for convincing the public that the coal business is conducted on a highly ethical plane.

Operators Feared Daymen Would Mine Coal

The mine workers take much credit to themselves for the victory at the recent Kanawha conference. The advance, which was important, has been a subject of a notice furnished to the papers everywhere by K. C. Adams, the press agent of the union. It declares that by offering a bonus the operators sought to stave off the formation of a new and more drastic scale. The union refused, it is said, to fall for the trap and the mine workers profited accordingly.

The argument is somewhat weak. If the leaders had accepted the bonus with welcome, it would not have paralyzed them when, their old scale having run its time, they came to seek a new wage scale of the Kanawha operators. The objection to bonuses such as those offered in central Pennsylvania is foolish. When the next contract period comes the mine workers will be entitled to a scale arising out of the then existing economic conditions wholly without any consideration of the bonus which the operators have granted.

It is said that the Kanawha operators were unusually liberal to the day workers when the scale was made because they feared that if the daymen did not receive a more liberal increase than the miners they would all seek jobs as coal miners, and the mines would be shut down because there would be no one to remove the coal after it had been dug.

Missouri Foremen Should Concede, Not Argue

At Kirkville, Mo., a mine is closed down because the company will not discharge a mine foreman who is charged with taking up too much of the pit committee's time with the discussion of controversies. The men regard a disposition on the part of the foreman to argue the company's side in a controversy as an offense. They object to paying the pit committee for so much time expended in debate and realize that their end would be obtained if they could secure a foreman who would give the mine workers all they ask for when they ask for it.

Another mine has struck out of sympathy with the first, as a warning probably to the foreman that concession and not argument is the right attitude for the modern mine foreman. These strikes are most unwarranted, for no foreman can waste the time of the pit committee unless the committee is willing, for Sec. 1 of the agreement says that where the mine committee and the mine foreman disagree the dispute "shall be immediately referred to the superintendent of the mine and the district president, or their representatives." Evidently the mine workers want to compel a concession from the foreman, not feeling that they would be granted their demand by the superintendent and the district president in conference.

At Williams, Okla., the company decided to reduce its working force, but the mine workers refused to allow any of the men to work if all the men were not retained. A four-day strike in the Bonanza district ended Mar. 27 by the men consenting to have their grievance considered in the manner which the wage contract provides. The district officials for once insisted on strict compliance with the rules relative to the settlement of disputes.

Editorials

Where We Stand

The industries of the nation are pledging themselves to do their full part in the defense of the Union. The coal industry, from mine owner to trapper-boy, is not behind any other in the fervor of its national devotion, and in its readiness to perform its full duty to the nation. And "Coal Age" as the principal organ of the industry, places itself unreservedly at the service of the President, pledging itself to promote the best interests of the nation in the crisis which now confronts the American people.

Preparedness in the Anthracite Trade

It has been a difficult winter for the anthracite trade; and now that the worst is over, thought is being taken of next winter. In many places the question is heard: How about next year? A careful study of the situation indicates that conditions may even be worse another year. Much, of course, depends upon a continuance of the present industrial boom; and even should this country become involved in war, which now seems imminent, there will be no lessening of activity in this direction; if anything, there will be acceleration.

It is well then to consider just how the domestic coal-consuming public is to be taken care of another winter. This past winter the public has only been kept from actual want by the three or four millions of tons of coal that had been stored in the vast yards of the large producing companies. It took three or four years to accumulate these stocks, and the yards are now entirely bare. Nothing, therefore, can be expected from that source next year, for undoubtedly every ton of coal that is mined this summer will go into immediate consumption. It is true the large companies are now busily engaged in reclaiming a large tonnage of coal from the immense culm banks in the anthracite region, and a greatly increased tonnage has been obtained from this source all season. Yet the matter of increasing it depends just as much upon the labor supply as the mines, and they have been badly hampered in this respect for the past year or two.

The dealers, of course, will stock every ton of coal possible, but even this will not eliminate the usual mid-summer idleness at the mines. The public must be appealed to directly and with some vigor. This movement can be accelerated by arranging so that the retailer will not be held up in his payments from the time the coal is put in until the consumer begins to burn it; there has been too much of the retailers' capital tied up in that way in other years. The very people who are able to secure such credit from the coal dealer are the ones who are best able to pay, especially at this time of national prosperity.

It would seem to us that the solution of the problem rests largely with that particular class. The other consumers belong to the great majority who are only able to buy their fuel from week to week, or month to month, and they are the greatest sufferers in time of stress. Those more fortunate should therefore do all in their power to avoid a condition that might make fuel unduly costly for those who can pay and almost prohibitive to those with a limited income.

The question arises as to how this is to be placed before the public. There is no particular reason why the entire burden of publicity should be thrown upon the retailer; it means just as much to the mine operators; and inasmuch as the latter have recently made good use of the press in putting their case before the public, there is no logical reason why they cannot do so again. This is one of those intangible obligations that are the concern of all and might easily, therefore, become the job of no one.

The big anthracite companies have, during the past year, exhibited a determination to protect the public from extortionate prices, irrespective of trade conditions, that has not been shown in any other line of industry. They have announced the usual spring and summer discounts at a time when the customary reason for doing so was not necessary and when, judged by the law of supply and demand, full circular prices could easily have been obtained. Should they not now go a step farther and by a vigorous newspaper campaign during the summer prevail upon the consumers to provide against a recurrence of the demoralized conditions of last winter?

Miners' Lamps

In an admirable paper on this subject by Edwin M. Chance, published in the *Bulletin* of the American Institute of Mining Engineers, the author calls attention to the gradual standardization of the practice and draws some pertinent conclusions that are of more than ordinary interest. It is clear that future practice in this direction is becoming well defined.

The first and most obvious point made is the fact that the day of the open oil lamp has passed, though it will probably never be entirely eliminated, owing to its peculiar adaptability for use in rapid air currents. The acetylene lamp has forged rapidly to the front and promises to assume the dominant place among mine illuminants.

In gaseous mines the electric cap lamp is tending to displace the flame safety lamp, because of its convenience and superior illuminating powers. Until some other method is devised, however, it will always be essential to supplement the electric cap lamp with a limited number of flame safety lamps for testing purposes. This latter lamp still remains the only practicable and reliable gas detector. It would seem in this connection that there is a field for the application of inventive genius; it is certainly not a compliment to the coal industry that in the century or more since this lamp was invented there have been only the most meager kinds of improvements made in it.

Writing for Technical Publications

A story is told of how Horace Greeley, the founder of the New York *Tribune,* was once asked if the word "news" was singular or plural. Greeley, so the tale runs, was averse to deciding the weighty question himself and dispatched to one of the correspondents of his paper a telegram which was worded as follows: "Are there any news in your locality?" In a few hours the reply came: "Nary a new."

Many questions, however, are not so easily answered. In this editorial it is not our intention to discuss grammar, syntax, etc., or the relation they bear to writing for technical publications. It is assumed that the matter of proper agreement of nouns and verbs, pronouns and antecedents, and kindred topics of an elementary nature, are understood by the reader. These have been covered in numerous grammars and books on rhetoric that may be obtained readily by those who feel they ought to know more about the subject.

The paragraphs that follow are intended for those practical men in the coal-mining industry who from time to time have made up their minds to write articles for *Coal Age* and have deferred doing so because they felt that their knowledge of English grammar was not sufficient to enable them to write something acceptable.

First, let us impress upon the minds of those who contemplate writing that it is not necessary to use "high-falutin'" language to put your efforts across. Indeed, many of the contributions that are submitted to *Coal Age* have to be "pulled down from the clouds" before they are finally printed. This pulling-down process consists in the weeding out of all flowery phrases and uncommon words, and in the blue-pencilling of passages that the authors evidently considered literature.

Coal Age is a technical paper that is educational. Each article that goes into its pages is carefully considered from the standpoint of teaching-value. Contributions, therefore, that are written in simple English, so that "he who runs may read"—and understand, have a better chance of being accepted than those that indulge in wild flights of rhetoric and leave the reader wondering what it is all about.

The man who attempts to eat a whole pie in two bites is in great danger of choking to death. No sane person would attempt it. Neither should any man who writes for publication attempt to tell a story of a hundred words in two sentences. His ideas are likely to suffocate somewhere among the commas and semicolons. The highest-salaried editor in the world writes in plain, everyday English and employs short sentences to convey his thoughts.

So for our first rule we have: Write in plain English and use short sentences.

The world does not look kindly on the man who tackles one job and leaves it before it is finished to begin another. The reader who finishes an article that describes a certain operation and finds that some important details have been left out in the description may be pardoned if he expresses his opinion of the author in language more forcible than elegant. Asylums throughout the country house hundreds of inmates who are incoherent in their speech—and waste baskets in all editorial offices are the final resting places of manuscripts that left their readers suspended in mid-air, like Mahomet's coffin.

So jot down rule two: Express your thoughts clearly and definitely.

If his Satanic majesty were to write an article on combustion, the chances are strongly in favor of its being authoritative. But what chance would the devil stand if he submitted his effort to a paper that devoted itself to needlework? The devil a chance, of course. If you write for *Coal Age,* you must keep in mind the nature of the publication and the kind of article it desires.

So rule three follows as a matter of course: Familiarize yourself with the publication and submit only articles pertinent to the field it covers.

By observing the three rules that have been formulated in the foregoing you will qualify more readily as an author who sees his writing in print.

Elaborate Storage Programs for the Western Roads

Western carriers are investigating the question of storing coal during the early spring and summer months. The experience of last winter has forcibly impressed railroad officials with the necessity of stocking up; there is also the fact that ample storage piles will permit the railroads to use more equipment for commercial coal during the busy season.

Again, some of the carriers are looking far ahead and realize that the wage agreements between the miners and operators of Pennslyvania, Ohio, Indiana, Illinois and Iowa, expire just a year from now; and from present indications it is evident that the miners will get substantial increases. The roads will therefore want to carry heavy stocks of coal during the coming winter season. It is doubtful if the operators can resist the miners' demands, because of the large increased revenue they will obtain in selling coal.

It is rumored that the Western railroads expect to store coal for consumption during next winter, beginning Apr. 1, as follows: Burlington, 1,000,000 tons; Chicago & Northwestern, 1,200,000; Santa Fe, 500,000; Chicago and East Illinois R.R., 200,000; Iron Mountain, 500,000; Illinois Central, 600,000.

The West Virginia Indictments

Whatever technical violations of the law the West Virginia operators may have been guilty of, the big outstanding fact of the whole matter is that the association has been open and above board in its operations. It has done nothing that it thought was not right and has certainly intended to keep within both the letter and the spirit of the law.

What effect the Government action may have will, of course, rest largely upon the decision of the court. However, there is perhaps more in the balance than is generally known. It is more than likely that the ultimate effect will be the enactment of legislation that will promote the development of business along the broad lines that have become typical of this day. The coal industry is too big and too important to be crippled and handicapped by petty restrictions. It is probable that this action may result in throwing off many of the restraining influences, and may even result in active governmental support, as in some of the more farsighted European countries, such as Great Britain and Germany.

Department of Human Interest

Successful Campaigning for Safety

By J. Kenvin*

The Workmen's Compensation Law of Pennsylvania has now been long enough in effect, and enough data should now have been collected and be on file in the companies' records, to furnish an immense amount of illuminating detail as to the ways in which accidents can and do occur.

Would it not be a valuable plan to have the compensation department at every colliery each year compile a summary of the accidents which have claimed its attention? Grouped under headings, which will suggest themselves as the accidents are tabulated, they should be studied by the official in charge of the company's operations. A still better plan would be to place a copy of the year's report in the hands of the employees with whatever comment was deemed advisable.

Such a digest of the year's compensation record would make valuable reading for any one interested in safety as it would show where effort to prevent accidents is most needed. To obtain the best results more frequent reports of this kind would possibly be desirable.

Many of the means of preventing accidents are by no means in the direction in which consideration is usually directed, as a few examples of needed precautions will show. For instance, enough attention is not paid to guarding the slippery places around works. Stair treads are often broken, and no one seems to realize how dangerous a broken tread may be. Other steps have become weakened by rot or by having heavy castings pushed over them. Especially is this true of breaker stairs, where castings are handled over the same steps by which the men travel to and about their work.

Then, again, at the foot of many a stairway runs a piece of machinery. There is no danger so long as the men who travel down the steps do not stumble and fall. But if they do miss their step as they descend the stairs, they are apt to roll into the machinery or may have their hands and arms caught by the revolving parts when they unconsciously throw them out in an effort to save themselves. Machinery at the foot of a stairway should be protected by a barrier stout enough to hold a falling workman.

In the mines it seems possible that greater safety would result if we would organize the repair men and driver boys in that work. In most cases they are familiar with every part of the section where they work. They frequently go into dangerous places and only their intimate knowledge of the underground workings prevents them from being hurt. On the other hand, the contract miners and laborers in the mine know its intricacies but little and in case of an emergency they may be caught.

The driver in any part of a mine should be given the duty of getting everybody out of his section in case of an alarm. It was the action of a night driver that brought this idea to my attention and proved how valuable these boys are. He was working in a section of the mines tending a gangway and supplying a few breast men with cars, when a pumpman went into a very dry pumproom with a naked light and there ignited the timber. The place was soon a roaring furnace as an upcast fan maintained a strong current of air in the place.

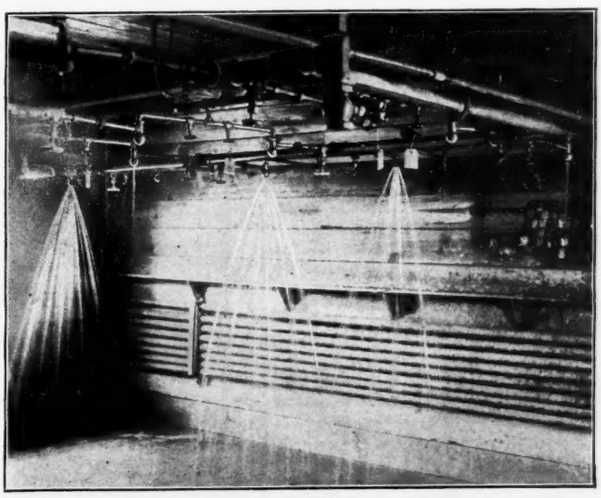
The driver got out his team and some other mules. As all the breast men were home, he went into the face of the gangway and searched for the fellows who were employed at the extension of that entry. They were gone, and not knowing where they were, he went outside and ran nearly a mile to their homes. Not finding that they had returned, he hastened back and found them up in a heading where they had fled at the first intimation of an accident. He was instrumental in saving them, and the thought occurred to me what a value these boys have as guides in such cases as this.

Success in reducing mine casualties will be largely proportional to the care and study we give to the accidents which actually occur in our mines. If we use the records of such casualties as textbooks for accident prevention, we shall be able to reduce their number and severity.

*Minersville, Penn.

Showers for Washhouses

The Oklahoma Consolidated Coal Co., at its No. 3 mine at Coalton, in Okmulgee County, Oklahoma, had continual trouble with "washhouse strikes" that caused several days of idleness every month, because the miners



SUCCESSFUL SHOWER DEVISED BY OKLAHOMA MAN

contended that the equipment furnished was not well fitted for the purpose. The company was about equally dissatisfied for the repair bill was large.

However, a local man, Everett Circle, a resident of Coalton, invented the so-called Circle shower, the name fitting appropriately both the invention and its deviser. It is practically indestructible, no repairs are necessary, and it is perfectly sanitary and efficient. It saves water, and with it no auxiliary tank need be supplied.

Putting Water in Miners' Houses

By a Pennsylvania Engineer

After doing many things to improve the welfare of the miners and coke workers in mining villages under my charge, I find that putting good water in their houses is something they appreciate most highly.

The domestic relations of men and women around coke towns have improved wonderfully of recent years, and one of the items bringing this about is water in the house. It used to be a common sight to see women and children carrying water from a common hydrant or pump for 1000 ft. or more, but this will soon be a thing of the past.

I also find after an extended experience in providing water to mining towns that many men do not know how to install water in the houses, and this includes machinists and their helpers. They do not draw any plans before they start, and so after a year or so they do not know the size of pipes installed, the location of the valves or any details of the installation.

I usually put 1-in. pipes on the main street for the first 500 ft. away from the main 4-in. line. Thereafter the diameter is reduced to $\frac{3}{4}$ in. The side lines to all houses measure $\frac{1}{2}$ in., and thus $\frac{1}{2}$-in. spigots can be used.

Such a location is chosen for the sinks as will give us a uniform length of pipes so as to make the work in the shop easy and cheap. It also allows the management to keep a few lengths on hand which will fit the requirements of the houses in case of an emergency.

After installing the water, rules for its use are left in each house. The tenants are instructed to shut the water off at the globe valve, to open the drain cock outside and to leave the spigots over the sink open every cold night. The line being drained in the house, the water is prevented from freezing.

All sewer pipe to drain water away from the house can be laid in the same ditch as the water line. A provision should be made for flushing the sewers and for the insertion of lye or soda ash, in order that no bad odors may be emitted. This provision, which has successfully removed one of the principal difficulties in operating a water system, is shown in the illustration (Fig. 2).

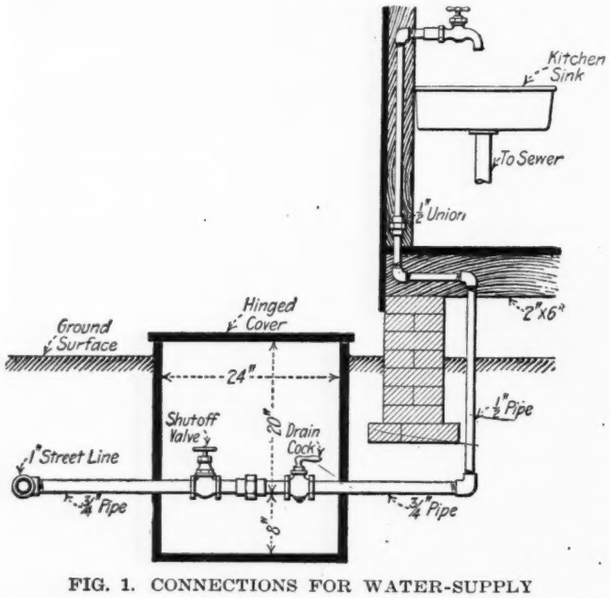


FIG. 1. CONNECTIONS FOR WATER-SUPPLY

The box is made of concrete and is 24-in. square. The walls are 4 in. thick, as is also the floor. It can be flushed by putting in a fire hose. Twice a week in hot weather soda ash or lye should be placed at A (Fig. 2) in the 8-in. space below the bottom of the sewer pipe.

About once a month, or more often if necessary, a competent man must inspect the flush box; if it is filling up, he must clean it out with a shovel. Such catch basins should be put in the sewer every 300 ft. In coke towns concrete work does not cost much, and the basins can be put in for $6 apiece and may save ten times that amount in one year if the sewer clogs up. Moreover, it makes the sewer sanitary.

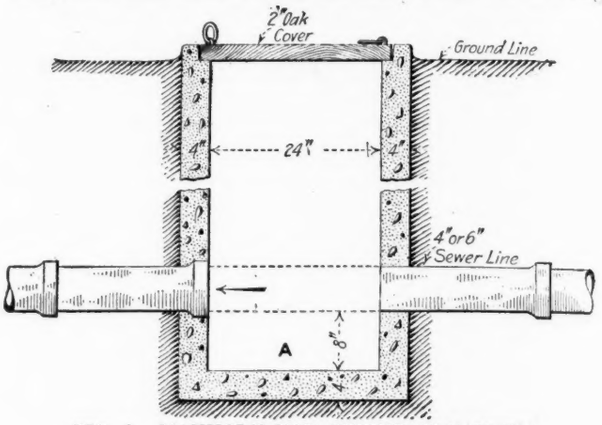


FIG. 2. MANHOLE FOR SEWER CLEANSING

Service Retirement Plan of Colorado Fuel and Iron Co.

The Colorado Fuel and Iron Co. has provided a Service Retirement Plan for all its employees. It will be administered by C. J. Hicks, executive assistant to the president; J. Chilberg, vice president and manager of sales; S. G. Pierson, vice president and general purchasing agent; J. B. McKennan, general manager, and F. H. Bentley, auditor.

The company has been in the habit of taking care of its old men by providing suitable employment or making other special provisions for those who, after long years of service, were unable to continue their regular work. This system is now replaced by a service retirement plan.

I. Service Retirement Board—The administration of the Service Retirement Plan shall be in charge of a Service Retirement Board (hereinafter designated the Board), consisting of five officials of the company, appointed by the president and approved by the Board of Directors. The Board shall elect a chairman and a secretary from among its membership. A majority of the Board shall constitute a quorum for all purposes.

II. Eligibility—All employees and officials, except the president, who have given their entire time to the service of this company, including its subsidiaries, are eligible for Service Retirement payments under the following conditions:

First: Compulsory Retirement—All men who have reached the age of 65 years, and women 55 years, and who have been 20 years or longer in the service, shall be retired, unless, in individual cases, in the discretion of the Retirement Board and the Board of Directors, some later date be fixed for such retirement.

Second: Retirement at Request of Employee, or in Discretion of Board—Any man who has reached the age of 60 years, or any woman 50 years, who has been 30 years or longer in the service, may be retired, either at his or her request, with the approval of the Board and of the president, or without the request of the employee, in the discretion of the Board and with the approval of the president.

Third: Retirement in Discretion of Board—(a) Any employee who has been 15 years or longer in the service and

who, by physical examination, is shown to be permanently totally incapacitated for any service, may, in the discretion of the Board and with the approval of the president, be granted a special allowance. (b) Any employee whose retirement on account of advancing years is, in the judgment of the Board, advisable, and who has been at least 20 years in the service, may, in the discretion of the Board and with the approval of the president, be retired and granted a regular or special allowance.

III. Amount of Payments—The monthly payments for regular allowances which the Board may authorize under this plan shall be 30 per cent. of the average pay per month of service during the 10 years next preceding retirement; but no regular allowance shall be less than $20 per month. Illustration: A retired employee whose pay, during the 10 years next preceding his retirement, has averaged $80 per month will receive 30 per cent. of $80, or $24 per month. The amount and duration of each special allowance shall be determined by the Board.

IV. Service—How Reckoned—The term of service shall be reckoned from the date of beginning either with this company or with any one of the various companies and properties that now compose it. Credit shall be given for the time the employee is actually on the pay roll and in active service.

V. Payments—Sec. 1. Payments shall be made through the regular disbursing office at the close of each month, and unless otherwise provided shall terminate with the death of the retired employee.

Sec. 2. In the discretion of the Board, these payments may be continued to widows and orphans for a limited period.

Sec. 3. In order that employees retired under this plan may continue the personal enjoyment of the benefits granted them, no assignment of amounts authorized will be permitted or recognized under any circumstances. As these allowances are purely voluntary, they shall not be liable, before payment, to claims of creditors or to any attachment or execution for debts of the beneficiaries.

VI. General Regulations—Sec. 1. No one retired under this plan shall be barred from engaging in any business not prejudicial to the interests of this company, or of any subsidiary company, but he cannot reënter the service.

Sec. 2. Allowances may be withheld, suspended or terminated by the Board in cases of misconduct, violation of law or of these rules, or for other causes sufficient, in the judgment of the Board, to warrant such action, or, in the discretion of the Board, may be paid to some other member of the family.

Sec. 3. This Service Retirement Plan is a purely voluntary provision for the benefit of employees retired after long and faithful service and constitutes no contract and confers no legal rights upon any employee.

Sec. 4. The Service Retirement Plan does not give to any employee any right to be retained in the service in addition to that guaranteed in the Industrial Representation Plan, nor does it deprive any employee of any right guaranteed to him by the plan.

Though not an integral part of this retirement plan, it is stated that the Colorado Fuel and Iron Co. has decided not to hire any men over 45 years of age, so that all men hereafter engaged and continuing in the service till 65 years of age will receive the benefit of the plan.

Safety Rules for Electric Equipment in Coal Mines

The United States Bureau of Mines has recently published Technical Paper 138, "Suggested Safety Rules for Installing and Using Electrical Equipment in Bituminous Coal Mines," by H. H. Clark and C. M. Means. The preparation of this code of rules, which has been going on for nearly three years, was undertaken to encourage the standardization of safety measures for the prevention of electrical accidents underground.

The code is the result of many conferences held by the authors with mining engineers, mine operators, the engineers of public-service companies and the manufacturers of electrical mining equipment. The rules have been revised many times at the suggestion of the conferees, and, as published, are said to meet with their approbation in almost every detail.

Mr. Clark, in discussing the technical paper, remarks:

In some respects the code is unique. The first step in its development was to establish five basic measures that would insure the use of electricity with safety and to formulate rules from these. Each rule is proposed as necessary or helpful to the accomplishment of one or more of these measures.

Especial attention has been given to making the code as complete as possible and to arrange the rules so as to facilitate consideration and reference. The authors have sought particularly to prevent the uncertainty, misunderstanding and confusion that arise from incompleteness and from contradictory and conflicting requirements.

Definitions have been established for an unusually large number of terms. Wherever these terms appear in the text they are "starred" to direct attention to their definition.

Some of the defined terms are the following:

Approved—The use of this term makes it unnecessary to include in the rules detailed specifications which will give rise to complaint, misunderstanding and endless debate unless given constant consideration and frequent revision. The use of the term makes it possible to take immediate advantage of any meritorious equipment, methods or practices that may be developed subsequent to the publication of the code. The indefiniteness that has been associated with this term and has discouraged its use is removed entirely by the definition which designates the approving authority clearly without restricting it.

Switchboard, Underground Station, Portable Motors—These terms have never been defined in connection with mine electrical codes and a definition has been needed to dispel the uncertainty that has existed as to their exact meaning.

Ventures To Define "Gaseous Place in Mine"

Gaseous Place—This is probably the most valuable definition that is offered. Of all the much-debated questions relative to coal mines, probably none has received more consideration and has been less satisfactorily answered than the question, "What constitutes a gaseous mine?" The authors found that it was indispensable to the success of the rules to have a term that should designate a place in a mine where, on account of the presence of gas or the potential presence of gas, it was unsafe to operate electrical apparatus at all, or unsafe to operate it unless it was especially constructed and safeguarded. After careful consideration the term "gaseous place" was selected to designate such a point in a mine. This term does not attempt to define a gaseous mine, a gaseous part of a mine or a gaseous district in a mine, but merely a place in a mine that, on account of the presence or possible presence of gas, is an unsafe place to operate electrical apparatus. Such a place is defined as "a place that is likely to be dangerous from the presence of inflammable gas."

It will, of course, be admitted by everyone that if a place is likely to be dangerous from the presence of inflammable gas, electrical apparatus either should not be used there at all or, if used, should be suitably safeguarded.

There are a number of desirable requirements in these rules that either have not appeared at all in other rules or have not been emphasized there. Among these requirements is a table for the carrying capacity of bare copper conductors. While tables of this sort have been compiled in the past, the current-carrying capacity assigned to the same wires has differed as much as 45 per cent., and the basis of reference was not in terms that were altogether applicable to the requirements of the rules.

Determines the Safe Current for Each Wire

The bureau, therefore, undertook to establish the carrying capacity of bare copper wires in terms of the amount of current that such wires would carry without charring dry wood, burlap and canvas brattice cloth pressed firmly upon the wire from a point about it. Tests were conducted to determine the amount of current that would produce positive charring for each wire examined. The current was then reduced until the charring was almost imperceptible and then, to introduce a factor of safety, 90 per cent. of this latter current was established as the safe carrying capacity of the bare conductor. This basis appears to be a practical one, since it will appeal to most people that a wire that is not hot enough to char wood is not a source of danger, while, on the other hand, a wire that is sufficiently hot to char wood cannot be regarded as a safe thing to have underground.

Stress has everywhere been laid on good construction and installation, as it is believed that this alone will help a great deal to bring about safe conditions. Wherever possible reference has been made to standardized practices (those of the American Institute of Electrical Engineers and of the underwriters), as, for instance, in regard to the name-plate rating of apparatus and the carrying capacity of insulated wires.

Discussion by Readers

Mine Discipline

Letter No. 1—There is scarcely any feature of coal-mining operations that is so closely associated with the success of the undertaking as the maintaining of a rigid mine discipline. Discipline in the mine insures a reduction of the number of accidents, both fatal and nonfatal. Accidents cause delay, create expense and reduce tonnage, all of which seriously interferes with the successful operation of the mine.

In my estimation, 75 per cent. of the accidents that occur in and around coal mines are the result of carelessness or ignorance on somebody's part. The average coal miner is inclined to take chances and is naturally reckless and prone to disregard danger. The passage of mine laws to prevent accidents and increase mine safety, while a necessary feature in the operation of mines, fails to become effective in the saving of lives and limbs until the laws are enforced.

The only way to enforce mining laws and regulations is to penalize men for the slightest violation of the rules. A fine may be imposed, or a man laid off for a few days when he has been guilty of violating the mine regulations once or twice, but a repetition of the offense should be followed by his prompt discharge from the service of the company.

While it may not seem right to some to discharge men for the violation of law, or disobedience, or neglect to follow instructions, it will be conceded by all that it is far better to discharge a few men than to kill or injure another. This principle should be upheld and followed even when men are scarce, for it is only by so doing that true discipline can be secured. When the men realize that the company means business, they will be more careful to respect laws and regulations and obey instructions given them by the mine officials.

Foreign vs. Native-Born Miners

As between foreign and native-born miners, English-speaking and non-English-speaking employees, I believe the average foreigner is more strict in his observance of the rules and regulations of the mine and quicker to obey any instructions given him than are English-speaking miners. The foreigner seems more used to being bossed, while many English-speaking miners are older than the boss, and their years of experience causes them to assume the attitude of the man who "knows it all."

In my 13 years' experience as mine foreman, I am glad to say I have had to record no fatal accidents and but one nonfatal accident. During this time, probably 85 to 90 per cent. of the men in my employ have been foreign miners.

As an illustration of the need of constant watch, care and vigilance, let me recite an incident that occurred a few mornings ago. I had had occasion to turn a few rooms ahead of where the rock was taken down in the heading, and let the night men take down the rock a little later. On going into the mine that morning, I found a loose rock hanging at the mouth of one of the rooms.

The miner was just starting out with a loaded car. I called to him to stop and, by two or three blows with a pick, brought down over a ton of rock. In reply to my "See what you were coming under?" he said, "H—, I saw that when I went in." This man was an American miner. His years of experience in mining coal had not taught him the necessity of avoiding danger. He was sore when I told him he was a fool to go under a place like that, knowing its dangerous condition.

Other accidents are caused by too great haste on the part of the miner to load his coal. In a machine mine, a short time ago, a miner had shot his coal at the road-head, but it hung and did not fall over. Having some coal down and an empty car, he started to load his car without first taking down the hanging coal. A little later, as he was passing between the car and the face, the coal fell, and he barely escaped with a fractured ankle that laid him up for four months.

As I remarked at the beginning of this letter, laws may be passed and safety devices installed in mines; but, to reduce accidents, miners must be disciplined. Only in that way can they be compelled to avoid taking unnecessary risks.

G. H. Lewis.

Karthaus, Penn.

A Successful Mining Operation

Speaking of record tonnages in coal mining, kindly permit me to draw attention briefly to one of the most successful mining operations of which I have any knowledge. The mine is located in the northern part of Cambria County, Pennsylvania, about a quarter of a mile below the town of Colver, on the Cambria & Indiana branch of the Pennsylvania Railroad.

The Ebensburg Coal Co., T. R. Johns, general superintendent, opened this mine early in 1911 by driving a rock tunnel 1500 ft. in length to tap the "B", or lower Kittanning, seam of coal. This seam has an average thickness, in Cambria County, of 3 ft. 9 in. The bituminous-mine reports for 1911 show that the mine employed 95 men underground and produced an output of 22,300 tons of coal.

Since that time, a large number of improvements have been made in the development of the mine and its equipment. The 7-ft. disk fan, which formerly circulated 33,000 cu.ft. of air per minute, in a single current, under a water gage of ¾ in., was later replaced by a 9-ft. Sirocco fan capable of circulating 160,000 cu.ft. per min. in 22 separate air splits, under a total water gage of 2 in. in the fan drift.

Today, the mine is equipped throughout with electricity. The machinery installed in the year 1914 included one 8 x 8-in. Deming electric pump; three Jeffrey 12-ton locomotives; one Howells and two Jeffrey rotary rock drills; two CE 6 and two CE 7 Sullivan shortwall mining machines; five pneumelectric puncher mining ma-

chines; five pneumelectric room hoists; and 500 mine cars.

Before this mine was three years old, it was producing 4000 tons of coal a day and employing over 1000 men. The mining report shows the output for 1914 was 984,238 tons. Much of the credit for the rapid development of the Colver mine must be ascribed to the former general superintendent, Mr. Johns, who was a capable man with a wide experience in coal mining.

The town of Colver is one of the most up to date and flourishing mining camps in Pennsylvania, containing many houses of different types, one of the finest hotels in Cambria County, a large company store, a commodious hall, two churches, a graded school, post office, and other buildings and points of interest that go to make up a thriving mining town.

The company maintains an efficient first-aid corps thoroughly equipped with mine-rescue apparatus and first-aid supplies. The town boasts of a large band consisting of over 50 different pieces. The mine itself is worked on the panel system. Most of the workings are driven to the rise, providing good drainage and insuring excellent haulage roads throughout the mine. In the month of May, 1914, this mine broke the world's record for producing coal in a low seam. The output of coal for that month was 114,200 tons. SAMUEL JONES.

Madera, Penn.

Success in First-Aid Work

Letter No. 1—One of the chief requisites in any large operation is the training and maintenance of a first-aid team, thoroughly equipped for efficient service. Few subjects are worthy of more careful consideration and discussion than the means and methods that should be adopted to make such work a real success.

The skillful manner in which the victim of a mine accident is handled by first-aid men will often prevent serious results. On the other hand, the lack of proper knowledge and training in first-aid methods may be the direct cause of a serious accident terminating fatally, owing to the improper handling or treatment of the injured person.

First-aid work that is badly performed is worse than none at all. For instance, the careless handling of a fractured limb, or the neglect to apply splints to prevent the fractured bones from doing further injury to vital parts, may cause complications that a physician, when he arrives, will find difficult to treat and overcome. The application of a dirty bandage or compress to a wound may cause infection and not only aggravate the wound but poison the entire system.

The greatest success can only be attained when the members of first-aid teams meet for practice and instruction at least once a week. A suitable room should be provided for this purpose and, to vary the monotony and arouse greater interest, the class can be divided into groups for the purpose of instruction. Each group should be in charge of one of the more experienced of the first-aid workers.

By this means more careful instruction can be given to beginners. From time to time, papers can be prepared and read and experiences recited by the members, regarding the treatment of accidents that occurred before first-aid work was made an essential part of coal mining. As a further attraction, smokers can be held and simple refreshments served, the occasion being made one of a social nature.

Every man working in and around the mine should be induced to attend first-aid meetings. There is no one but will find the instruction he receives of great value to him in his home as well as in the mine. No one can tell at what moment he may be called upon to perform first-aid work for another. Accidents occur when they are least expected, and every man should be ready to give the best service possible, at such times, to relieve an injured one.

In order to encourage this work and insure the greatest success, first-aid material of all kinds should be freely supplied by operating companies. Supplies should not only be available for instruction work, but should be maintained at convenient points in and around the mine, where they will be accessible in case they are needed and no delay will be necessary in order to secure them.

Uniontown, Penn. JOHN T. BRADLEY.

Service That Is Appreciated

Letter No. 1—What is more successful than success? I am led to make this remark after reading the Foreword in *Coal Age,* Feb. 24, which recalls the inquiry of "Dee" that appeared in the issue of Nov. 4, p. 776, and which was followed by a number of letters discussing the "Reward of Long Service." I was much interested in learning what the writers of *Coal Age* would say in reply to Dee's inquiry and was not disappointed in their view of the situation.

From the employer's point of view, Dave had no kick coming. He was transferred to the Dunbar plant because his employers considered him the best man for the place. When his work there was finished, he was given another charge. Although he was a good man and filled the position with credit to himself and satisfaction to the company, the latter did not consider there was any obligation on its part to advance him to a better position.

To the disinterested onlooker it would seem that the policy of the company, in this regard, was a shortsighted one. The same motive that induced the company to bring Dave to Dunbar should have prompted it, when that work was finished, to advance him to a still higher position worthy of his good qualities. He should at least have received preference over another of fewer qualifications than he possessed.

EVERY EMPLOYEE A COG IN THE WHEEL

The successful manager regards such a situation with a broader aspect than was manifested in the treatment Dave received. He considers each man in his employ as a cog in a large wheel whose revolutions represent the operations of his company. As the wheel goes round each cog meshes into another and performs its proper share of the work. If any cog becomes worn or defective, it must be replaced by one that will give better service and create less friction.

Bearing this illustration in mind, men who shrink from every possible task are like the small cog that shifts its burden to its neighbor, which is thus unduly strained. Again, men whose self-esteem causes them to swell up until their clothes do not fit them are like the cog that is too large and which, when meshing, causes a bump or

friction, resulting in great loss of efficiency. It appears that Dave was one of those cogs that meshed in without jar or friction. He performed his work well and quietly. There was no attempt to blow his own horn or to shift his work onto another.

Knowing something of the history of Dave, allow me to supplement what has already been given with a little of his later experience. As my little boy says, "I'll tell you." It was not long after the incident narrated that Dave left the employ of that company to accept a better position with another company whose manager was looking for a man of his ability. The change meant a raise of 30 per cent. on Dave's former salary. "Now," as the boy says again, "What do you think of that?" In addition, Dave had the promise of an increase of 25 per cent. in his salary as soon as the work would justify the raise.

The policy of the new company, however, was not an exclusive one and, in Dave's case, it proved a boon, as he was generously recommended to the management of another company where a vacancy occurred that would mean a raise of 33⅓ per cent. in salary. But, knowing that his services had been appreciated, Dave, in the same generosity of spirit, told his manager that he was going to remain where he was, which was a wise choice.

In closing, permit me to say that any man of average ability, who is honest and industrious, can look forward to rise to a higher position as his period of service lengthens. Such a man should be in line for promotion whenever a vacancy occurs that he can fill. Any wise management will recognize this as the right of a faithful and capable employee. Men must be treated as men, and not as tools. I am glad to be able to give this little supplement to Dave's former experience.

Osceola Mills, Penn. S. D. HAINLEY.

Letter No. 2—The last paragraph of the Foreword, *Coal Age,* Feb. 24, in regard to the employment of an expert fireman, recalls an experience of my own that illustrates, however, a service that was unappreciated.

A short time ago I was induced to accept a position as mine foreman with a company that was supposed to have a great future and whose service offered good chances for promotion. On taking up my duties in the new position, I was instructed to report to the storekeeper, to whom I was introduced as "the new super."

I found the storekeeper to be a very congenial person and, after a short conversation with him, proceeded to the drift mouth of the mine, which we will call "Ella No. 1." My introduction at the store as "the new superintendent" was a little in advance of what I had expected. It did not set me up, however, as I knew my duties were those of a mine foreman, and I was in no way disappointed when, a little later, the real superintendent made his appearance on the scene.

On my arrival at the drift mouth, I found a serious condition of affairs. Men were at work attempting, as the boss in charge explained, to "improve the appearance of the opening." They were vainly trying to overcome the effects of a slip that threatened to close the mouth of the mine. Their efforts were directed to uncovering the timbers, which they then expected to replace with more substantial supports.

A hurried examination of the drift, however, showed me that the slip had gone beyond control, and time and money would be saved by allowing it to take its course. The material was working like quicksand and had already crushed several timber sets in the drift. It was a bad situation for a new man to tackle.

Taking the boss aside, I explained to him in a few words the impossibility of accomplishing what they had undertaken. It developed that the man was only working according to instructions from the superintendent. He fully agreed with me, however, and the use of a little dynamite brought the slide down, after which efforts were directed to clear the way for a new opening, which was quickly done.

TROUBLES OF A NEW FOREMAN

The following day saw a great improvement. It was then that the real superintendent came around. He paid no attention to me, at first, but busied himself asking questions of the boss in charge of the work. Later, he approached me and, after a brief salutation, announced a reduction of wages and consolidation of work, stating that the men had been paid in excess of what the work demanded. He gave me instructions that the list he had prepared must stand, or he would shut down the mine. The outlook appeared blue for poor Ella No. 1.

The engineer was to do his own firing, hoist the men and coal and attend the fan, for which he was to be paid $65 a month. It is needless to say that the man declined to accept this change and quit his place.

As soon as the superintendent had gone, the dissatisfaction among the men was manifest, and the conditions were not encouraging. I decided not to act in haste, preferring to understand my position and authority better before assuming control. Two firemen were tried who quickly proved that they knew nothing of firing, as they could not raise more than 60 lb. of steam, no matter how much coal they burned.

Then, I found an old fireman and put him to work, with the result that in two hours the boiler was popping at 100 lb., when we were only allowed to carry 90 lb. of steam. In doing this he burned from 1½ to 2 cars less coal in a double turn. The coal thus saved more than paid the difference in the salary of the fireman.

As may be expected, the superintendent did not appreciate my action in the matter, and it was soon evident that no efficient service could be rendered under his supervision and direction of affairs. It is needless to add that my service with that company was of short duration, and I was glad to resign and hunt a more favorable proposition, where honest efforts would be appreciated and where a man in charge of the work would have the right to use his own discretion and judgment in consultation with his superior in office. EXPERIENCE.

———, Penn.

Testing Mine-Rescue Apparatus

Letter No. 3—The letters on this subject, which appeared recently in *Coal Age,* bring to mind an experience that I shall never forget, and one that shows the need of testing all apparatus before it is worn in a dangerous atmosphere. The experience might have proved more serious; but, fortunately, I only suffered a severe headache as a result of my carelessness in not properly testing the apparatus before entering the chamber for practice.

I had been training for rescue work, at an Illinois mine-rescue station, in September, 1915. Having taken

a lesson one morning and desiring to return in the afternoon, I was told that this might cause sickness. Nevertheless, I decided to take the chance. My experience in the afternoon, however, was not a pleasant one.

Having donned the apparatus, I proceeded to enter the chamber, which was charged with sulphur fumes. After a short time, I detected the smell of sulphur in the apparatus I was wearing and, a little later, my breathing became difficult, which was quickly followed by a severe headache. I readjusted the nose clip, which was already in its proper position and was not the cause of my trouble. The difficulty becoming unbearable, I signaled the assistant and made him understand that I was sick.

On coming out of the chamber and starting to clean the apparatus, the real cause of the trouble became apparent. The bag contained a puncture. The assistant told me that I had got hold of an old bag that had been previously condemned, but which had, in some way, become mixed with the other apparatus.

The lesson taught me was a good one and will not be forgotten soon. It shows the importance of every man making a careful examination of the apparatus he intends to wear, as has already been explained in previous letters.

Peru, Ill. GASTON LIBIEZ.

Mine-Accident Record

Letter No. 17—Allow me to recite briefly a few accidents that happened some years ago in Northern France, in the mines where I was employed.

For the purpose of hoisting as much coal as possible on a single cage, in those deep shafts, the cages were often built with two or more decks. In some instances twelve cars were hoisted on a cage having three decks, four cars being placed on each deck. As may be supposed, the clearance between the top of the cars and the deck above did not exceed four inches.

In order to save time in caging, when men were to be lowered they got into the cars, which were pushed onto the cage as it was brought to the landing. Four men would get into each car. The men often had their heads bumped against the deck and were fortunate to escape being beheaded.

ACCIDENT IN A HOISTING SHAFT

On one occasion when men were being hoisted from the mine, a car full of men was started forward before the cage was down. The car ran into the sump and the four men were killed by the descending cage. Notwithstanding this terrible accident, this practice of caging the men was still in use when I left, four years ago.

I recall one accident that happened at the mine that resulted in a boy being killed and two others badly injured. The distance from the floor of the tipple to the lower landing at the surface was 40 ft. Three slate pickers were on the ground, at the lower landing, when a cage was being hoisted. It happened that the guard holding the cars on the cage had become loose, and when the cage reached the surface one car was shot out of the cage at the lower landing and fell among the boys, with the result as stated.

In those mines the clearance at the side of the haulage road was scarcely sufficient to allow a man to pass between the cars and the rib. The superintendent and foreman were going into the mine one day when they were met by a driver coming out with twelve loaded cars. They managed to squeeze themselves against the rib and would have passed the trip safely had it not been that one of the cars was derailed, which caught the superintendent and pinned him against the rib. He died from his injuries a short time later.

In another instance a boy was stationed at the head of an incline and charged with the duty of coupling the cars and attaching them to the rope by which they were lowered on the incline. On one occasion, being given the signal from the man at the foot of the incline, the boy started the trip forward before coupling all the cars together. When he observed his mistake he seized the wire signal and kept ringing to warn the men below of their danger, not noticing that he, himself, was standing over the rope that was attached to the other cars, which were also running down the plane. When the trip brought up at the bottom of the incline the rope was pulled tight, catching the boy and cutting him through to the waistline. He died the same day.

MAN KILLED IN A LOADING CHUTE

One of my best friends was killed in a vertical seam. It happened that his chute became blocked with large lumps of coal and, in order to dislodge them, he took a small stick of dynamite primed with a cap and fuse. With a handful of clay he ascended the chute and, having placed the charge against the coal, lit the fuse. The shot went off before he could get out of the chute and he was killed instantly by the rush of coal.

Many accidents like these could be recited, in which men have lost their lives, or were blinded or crippled as a result of their own or someone's carelessness or recklessness. The story of these accidents should make men more careful. FRANCO.

——, Ill.

After the Accident

Letter No. 3—It surprised me greatly to read the account given by John Rose, *Coal Age*, Mar. 17, p, 488, in regard to miners drilling out failed dynamite shots with hammer and steel. I cannot understand how any sane man would attempt to do such a thing, or how the practice would be tolerated by any mine foreman.

In my opinion, the management is grossly to blame if miners are allowed to drill out a shot that has misfired, but the use of "hammer and steel" for that purpose, where the charge is dynamite, is beyond conception. Should a mine foreman allow such a practice in one of our mines, he would be looking for another job before night.

In the mines of the H. C. Frick Coke Co., the miners are not allowed to either load or fire their own holes, which is done by men employed for that purpose. If this rule were followed more generally, there would be fewer accidents from blasting in mines.

In connection with accidents caused by disobedience of rules, let me briefly describe a fatal accident that might occur in any slope mine. As is well known, miners and company men frequently have occasion to go to the surface on some errand during working hours, while coal is being hoisted.

Suppose a tracklayer must go to the blacksmith shop to get a latch for a switch which he has laid. He reaches

the slope bottom just as the bottom-man is preparing to send a trip of coal up the slope. The tracklayer asks him to let him ride the tail end of the trip as it goes out and, though contrary to the rules of the mine, permission is reluctantly given.

On the way up the slope the man's head comes in contact with a low collar, and he is knocked off the trip and lies unconscious on the track. The bottom-man knows nothing of the accident and when all is ready signals the surface to lower the trip of empties. The result is that the unconscious tracklayer is killed by the cars—the victim of his own disobedience of the rules of the mine.

The real blame for this accident, however, rests with the bottom-man, whose duty it was to see that the rules of the mine in respect to men riding a loaded trip were obeyed. While this case is only assumed, I make the suggestion in the hope that it may emphasize the importance of all mine workers complying strictly with the rules and regulations in force in a mine. JOHN H. WILEY.

Oliphant Furnace, Penn.

Fireclay Deposits in Canada

Kindly allow me to correct a statement made in an article published in *Coal Age*, Mar. 24, p. 519, entitled "Fireclays That Are Mined." After referring to the production of firebrick in Scotland, the writer states: "In Canada, in the search for so-called fireclays, attention appears to have always been directed to surface-clay deposits. In view of that fact, a reminder that such clays occur otherwise may not be amiss."

The author of this statement could not have been acquainted with the publications of the Department of Mines of Canada, or he would have known that all the reports on clay and shale deposits issued by the department give special prominence to the clays that occur interbedded with sandstones or other sedimentary rocks. Indeed, attention has never been directed to surface-clay deposits as a probable source of fireclay.

Some of our best fireclays occur in the Tertiary rocks of British Columbia, where they are mined for the manufacture of firebrick. Another type of fireclay deposit occurs as a dike in the Pre-Cambrian quartzites, in the Province of Quebec. I mention these facts as being of possible interest to the writer of the article to which I have referred, since it would appear from his brief references to such deposits that they are almost wholly confined to the Carboniferous system.

JOSEPH KEELE, Chief Engineer,
Ceramic Division, Department of Mines.

Ottawa, Canada.

Practices in Blasting Coal

Letter No. 1—Having had considerable experience both as shotfirer and fireboss—two positions that I consider the most important in a coal mine—I have been much interested in reading the letters regarding accidents that occur so frequently in the use of powder in blasting coal.

It is of the greatest importance that shotfirers use every possible precaution to avoid accidents. I am surprised to learn, from some of the letters written, that shotfirers do not go into the mine, in some cases, until just before the time to shoot. This certainly is a great mistake and should not be allowed.

In my opinion there should be a law in every coal-mining state compelling the employment of shotfirers who are competent men and requiring them to examine all holes before they are charged or tamped. Indeed, every shotfirer should charge and tamp the holes he must fire, in order to insure his own safety. A shotfirer should be authorized to refuse to fire any shot that, in his judgment, is unsafe.

Another essential factor of safety is the limiting of the size and depth of the hole and amount of powder in a charge. This is important whether using black powder or permissible powder, and whether shooting off the solid or after the coal has been mined. I think it is more important that the company should place these restrictions on blasting the coal, rather than that they be incorporated in the mining law. My reason for this opinion is that each company understands its own needs best.

I may be allowed to give a little of my own experience while employed to fire the shots in a mine where the company had placed a limit on the amount of powder to be used in a single hole and size and depth of the hole. The coal was shot off the solid, black powder and fuse being used for blasting. Without being tedious, I will explain briefly that my duty was to go into the mine at 9 a.m. and assist the fireboss in his work of bratticing, until noon. In the afternoon he assisted me in the inspection of all shots, which were to be fired after the men left the mine. We each had our own district and inspected and examined each hole before the charge was inserted. It was our duty to see that the charge was properly made and tamped with fireclay, which was brought from the surface for that purpose.

TRICKS OF UNSCRUPULOUS MINERS

It occurred, not infrequently, that the examination of the hole with the scraper would show a charge of powder had already been inserted by the miner and pushed to the bottom of the hole. At times also the dummy, which was supposed to be filled with clay for tamping, would be found to contain powder instead.

These facts show the tendency of some miners to put one over on the fireboss or shotfirer, and the most careful examination of each hole was required to prevent its being overcharged with powder and improperly tamped. If these things occurred in my experience, it is reasonable to suppose that the same tricks were played on every shotfirer in the mine.

If men will take these chances when they are watched, what will they do when there are no restrictions placed on such practices? When a miner was detected in an effort to circumvent the regulations in the mine, he was either warned or sent home and his case reported to the foreman. Frequently, that would be the last work he would be permitted to do in the mine.

To the credit of the superintendent, mine foreman and the miners' union, it must be said that they all protected the shotfirer and the fireboss in the execution of their work in the mine. Most of these officials had gone through the experience of two disastrous explosions that had occurred in that vicinity within a short time of each other. The effect was to convince them that it was better to be safe than to be sorry afterward.

Superior, Wyo. GEORGE A. BROWN.

Inquiries of General Interest

Capacity of a Pump

The following question was asked in the Pennsylvania bituminous mine foremen's examination last year:

What is the capacity per minute of a pump 12 in. in diameter, running at a piston speed of 100 ft. per min., allowing 15 per cent. for leakage?

I would like to know how this question can be answered without knowing the stroke of the pump. I understand that the candidate was supposed to assume a stroke of 12 in., but if he was not a good guesser he would lose out. Kindly explain. READER.

Johnstown, Penn.

It is true that the question does not state the length of stroke of the pump. The piston speed is given, however, which enables the capacity of the pump to be calculated in the usual manner. This question was answered in *Coal Age*, July 15, 1916, p. 124. The answer is as follows:

The sectional area of the pump cylinder is $0.7854 \times 12^2 = 113.1$ sq.in. The piston displacement is then $113.1 \times 100 \times 12 \div 231 = 587.5$ gal. per min. Then allowing 15 per cent. for leakage, the water pumped is $100 - 15 = 85$ per cent. of the piston displacement, or $0.85 \times 587.5 = 499+$, say 500 gal. per min.

Grounding Electric Machines

Referring to the Bituminous Mine Law (1911) of Pennsylvania, kindly allow me to ask a question relating to the grounding of electric machines used in mining. The law reads as follows (Art. 11, Sec. 1):

3. All metallic coverings, armoring of cables, other than trailing cables, and where installed underground, the frames and bedplates of generators, transformers and motors, other than low-voltage portable motors, shall be efficiently grounded, as shall also the neutral wire of three-wire continuous-current systems.

I would like to ask if this law is understood to include electric coal-cutters and, if so, would any danger arise in connecting the bed of the machine with the return wire? Would it be possible for the machine when so connected to become charged to the extent of 550 volts and the machine runner not know it and receive a shock that might prove fatal?

Again, if a stationary-hoist motor is grounded to the return wire and the fuse on the return wire should blow out, or the return wire be broken while the motor was running on full load, what effect would be produced on the frame of the motor? Would the frame of the motor, in that case, become charged and be liable to give a person coming in contact with the frame a possibly fatal shock. MAX.

Smithton, Penn.

It may be assumed that the intention of the law quoted by this correspondent is to include all electric coal-cutting machines. Although not common in mining practice and unnecessary, provided the insulation of the wires and the motor is perfect, the frame of all coal cutters should be thoroughly grounded in order to insure the safety of those operating the machine and others who may come in contact with the frame.

A machine should not be grounded, however, by connecting its frame or bedplate with the return wire. Such a connection would cause a person coming in contact with the bed of the machine to receive a fatal shock, in case the positive wire became grounded owing to imperfect insulation of the cable, caused by its being injured in use. The current would then pass through the ground to the person and through him to the bed of the machine, thence returning by the other wire.

The only safe practice in the operation of mining machines, which are subject to very severe usage, is to ground the bedplate of the machine, or the machine frame, to a grounding wire, or otherwise insure a perfect grounding of the machine that has no reference to the return wire, which is always an unsafe practice.

In regard to the blowing out of a fuse or the accidental breaking of the return wire, when the latter is connected to the bed or frame of the machine, it may be stated that neither of these occurrences would have any effect to charge the bed or frame, as there would be no current passing when the return wire was broken or the fuse blew out, although the motor was running on full load at the time.

Weight of Moisture in Air

Kindly explain the formula for finding the weight of moisture in air, given in reply to the fourth examination question on page 34 of the issue of *Coal Age* for Jan. 6, and show how the constant 0.82757 is obtained.

Curtisville, Penn. STUDENT.

The weight of moisture contained in a cubic foot of air when fully saturated is calculated by the same formula as that used in calculating the unit weight of air, except that, for the barometric pressure supported by the air, there is substituted the vapor pressure expressed in inches of barometer. The result must then be multiplied by the specific gravity of the vapor, which is 0.6235.

The formula for finding the unit weight of air in terms of the barometric pressure and the temperature is

$$w = \frac{1.3273B}{460 + t}$$

But, since $1.3273 \times 0.6235 = 0.82757$, the formula for finding the weight of water vapor, when the vapor pressure p_v is expressed in inches of barometer, is

$$w_v = \frac{0.82757p_v}{460 + t}$$

This unit weight of water vapor, multiplied by the total volume of air in circulation, gives the total weight of moisture carried into the mine by the air current, in a given time, when the air is fully saturated.

Examination Questions

Miscellaneous Questions

(*Answered by Request*)

Ques.—How would you proceed to timber an entry with a tender slate roof requiring crossbars, keeping in view both safety and economy?

Ans.—Much will depend on the exact nature of the roof material in respect to its tendency to flake off, under the action of the air, and fall. In most cases it will be better to keep the permanent timbers some distance back from the face, where they will not be in danger of being blown out by the shots. In many cases it will be necessary to set posts temporarily for the support of the roof above the miners, to protect them while working at the face. These posts will naturally be blown out in blasting the coal, and it will then be necessary to approach the face with caution and reset the timbers after firing and before loading the coal. Lagging must be used above the timber sets, in order to give the needed support.

Ques.—What useful information can a mine foreman obtain from a mine map made in accordance with the law?

Ans.—Assuming that the mine map has been carefully made from the notes of an accurate survey, it will show the relation of the different rooms and entries to each other and to the various features on the surface to which proper regard must be paid in the extraction of the coal and the development of the mine.

A good mine map will also show the records of prospect holes and give the thickness of the coal and thus enable the mine foreman to plan the development of the mine intelligently. It will also give him the information necessary to enable him to take advantage of the general inclination of the seam, so as to obtain good drainage and haulage in the mine.

By using the proper scale, the mine foreman will be able to determine the approximate distance between different points in the mine, which will be particularly useful to him when driving places to meet each other. The mine map should also show with accuracy the position and extent of the workings of adjoining mines.

Ques.—What precautions should be taken in the development of a mine with the view of recovering a large percentage of the pillar coal with safety and economy?

Ans.—The general plan of the mine should be carefully considered with respect to the nature of the roof, floor and coal, depth of cover, thickness and inclination of the seam, amount of water in the strata, the presence of gas and its probable effect on the working of the seam, in the extraction of the coal. Such a system of mining should be adopted as will afford the greatest safety and economy. In inclined seams, the haulage roads must favor the movement of the loaded cars.

The conditions may call for the adoption of the long-wall method of mining, the room-and-pillar method, or some modification of the panel system, each of which has its particular advantages in respect to safety and economy in mining. It may be necessary to drive the butt headings to the boundary and extract the coal on the retreating system, in order to secure the largest percentage of pillar coal. It is very important to consider well the relative size of pillar and opening, in driving the rooms, as well as to have due regard to the possible length of the rooms, as determining the distance apart of the cross-headings.

Ques.—To what elevation will the suction end or draft pipe of a siphon draw water when the barometer reads 24 in. of mercury?

Ans.—For a short length of suction pipe, a handy rule makes the suction lift, in feet, $\frac{9}{10}$ of the height of the barometer in inches. Thus, when the barometer reads 24 in., the possible suction head, or lift, for a short pipe, is $0.9 \times 24 = 21.6$ or, say 21 ft. For a greater length of suction pipe, however, it is safe to limit the suction head of a siphon to $\frac{8}{10}$ of the barometric reading. The reason for this is that the greater friction, due to the flow of water through the long pipe, reduces the possible suction head. Thus, for a long pipe the safe suction head corresponding to 24 in. of barometer is $0.8 \times 24 =$ say 19 ft.

Ques.—If a slope pitching 6 per cent. is 2000 ft. long, 10 ft. wide and 6 ft. high and filled with water, so that the edge of the water is within 1200 ft. of the mouth of the slope, estimate the quantity of water in U. S. gallons.

Ans.—Since the height of the slope is 6 ft. and it dips 6 per cent., the water will reach the roof at a point 100 ft. farther down the slope than the edge of the water on the floor. The slope would thus be full of water to a point 1300 ft. from its mouth, which makes the average length of the wetted longitudinal section $2000 - 1300 + \frac{1}{2}(100) = 750$ ft. The cross-section of the slope is $6 \times 10 = 60$ sq.ft. The cubic contents of the water is therefore $750 \times 60 = 45{,}000$ cu.ft., and the quantity of water expressed in U. S. gallons is then $45{,}000 \times 1728 \div 231 = 336{,}623$ gallons.

Ques.—Explain the difference between the behavior of a Davy and that of a Wolf lamp, when these are exposed for some length of time in an explosive mixture, and give the reason for this difference in the behavior of the lamps.

Ans.—The Wolf lamp is apt to be extinguished in an explosive mixture of gas and air, while the Davy lamp when introduced into such a mixture will flame, and light explosions may occur within the lamp. Neither of these lamps should be exposed for any length of time to an explosive mixture of gas and air.

Where a less percentage of gas is present, the Wolf lamp heats more readily in gas than the Davy lamp. This is owing to the volatile nature of the oil burned in the Wolf lamp. In testing for gas with the Wolf lamp, what has been called the "fuel cap" has often been mistaken for a gas cap, the former resulting from the volatilization of the oil. This does not occur with the Davy lamp, which is a more reliable means of testing for gas.

Book Reviews

Hurley's Book on Business Principles

AWAKENING OF BUSINESS. By Edward N. Hurley, chairman, Federal Trade Commission. Pp. xviii + 240; 5¼x8 in.; no illustrations. Doubleday, Page & Co., Garden City, N. Y. Cloth boards. Price, $2 net.

This book, by the former chairman of the Federal Trade Commission, exhibits those ideas which have given him nation-wide fame. But the careful thinker will not be able to avoid the inference that with all his apparent clearness of thought he has some of those heresies that have made Frank A. Vanderlip term us "a nation of economic illiterates."

He introduces as the protagonist President Wilson, saying: "With a statesman-like grasp of world conditions, President Wilson said on Sept. 2, 1916, 'A new age, a revolutionary age, needs new purposes and ideas. . . . We can no longer indulge our traditional provincialism. We are to play a leading part in the world drama whether we wish it or not. We shall lend, not borrow; act for ourselves, not imitate or follow; organize and initiate, not peep about merely to see where we may get in.'"

Let the reader examine this statement and see what it teaches and just how it is misleading. "We shall lend, not borrow," it says. That may or may not be true. If the opportunities for investment remain better here than abroad, we shall still borrow and not lend. Almost every large and thriving corporation has money borrowed, and only banking concerns which have no means or privilege of using money themselves are lending it.

If the corporation can derive more money from investment than it must pay for the use of the money, the borrowing is profitable and likely to be extended. So a nation which pays 4 per cent. on its government debt is likely to borrow money of one that pays only 2½ per cent. on its debt. The chances for investment are almost sure to be more numerous where the payment on the government debt is more generous, for otherwise the government debt would be underwritten at a lower figure.

DO WE REALLY WANT TO LEND OTHERS MONEY?

But if we grant that "we shall lend, not borrow" is true, then our good fortune is of a dubious kind; for we find that the nation is altogether too small, too cabined and confined for us, and we have to send our wealth out to find a place for it. This is, of course, not at all impossible, even though it is undesirable. We may be able to send our money to countries where the rate of interest is as high or higher than our own. In that case, though, it will be building up rival civilizations and not our own; however, it will be bringing returns here so there will be some compensation so long as the capitalist does not follow his capital abroad and expatriate himself.

Grant that it is true that we become great lenders, then there will be usufruct or profit flowing in from foreign countries all around. How will people be able to pay us this usufruct unless we take of them more than we send to them? The balance of trade will inevitably go against us. We shall import more than we export, just as every rich man who has rents and money at interest receives, or at least expects to receive, more service in person and material than he renders to other people. He says: "I let my money work for me."

Yet despite the preface saying that we shall lend money abroad, the motto of this book is: Increase exports—though the sale of our merchandise involves the purchase of the merchandise of others unless we are large borrowers of the foreigner's unused labor-capital. If we sell, we must buy. As for "traditional provincialism," whatever that means, it is incurable. We must do business the way business is done. We must continue to "peep about merely to see where we may get in," for we can only sell what foreigners want and can continue to do business only if we purchase what foreigners can best produce. We shall always shrink from doing the whole world's work; we shall never be allowed to do for foreigners what foreigners can best do for themselves. Economics is going to rule no matter how lordly our manner or how unquenchable our avarice. We may as well face that fact, but it need not trouble us. Nothing is either better or worse because it is alien. We can live comfortably with and without foreign trade except insofar as foreign lands have materials we cannot produce.

The first chapter of the book, "Back to First Principles," tells us that if we would be successful we must sell things for more than they cost us—an extremely elementary proposition, but one which we are always forgetting in our keen anxiety for business and our loose commercial methods. The author closes his chapter wtih the words: "Just as any locality is seriously injured by an epidemic of sickness causing death and disaster, so, in business failure, the community suffers from business death and disaster." Yet there are people who would be quite satisfied to see every manufacturer and merchant lose money, forgetting that the impoverishment of every capitalist means that the unexpended labor fund of previous years is being exhausted and that the people are becoming continuously poorer. If every capitalist loses money, the country becomes impoverished as in a war; for what time destroys is not replaced.

The chapters following deal with cost accounting, better business methods, merchandising, trade associations here and abroad, and with banking and investment abroad. The author advocates coöperation in foreign trade such as the Webb bill will make possible. In this matter he is most assuredly right. Whatever foreign trade we do, we desire that it shall be profitable; and we must meet combine with combine if we would succeed. The author discusses the Sherman law in a sane way and explains the attitude of the Federal Trade Commission. At the close of the book the act under which the commission was formed and a part of the Clayton act are published. The book is interesting from cover to cover. Hurley's meaning is always clear and his ideas always clever.

Industrial Applications of Chemistry

ELEMENTS OF INDUSTRIAL CHEMISTRY—By Allen Rogers, in charge of industrial chemistry, Pratt Institute, Brooklyn, N. Y. Pages viii + 495 + 17 index; 5½ x 8⅜ in.; 117 illustrations. D. Van Nostrand Co., 25 Park Place, New York, publisher. Cloth boards. Price, $3 net.

This volume is an abridgment of a larger book entitled "Manual of Industrial Chemistry," a work which was written by forty eminent specialists in chemical engineering. In its almost 500 pages of text it covers widely, but perhaps not deeply, the whole field of industrial chemistry.

The volume opens with a chapter on "General Processes," by which is meant practically the machinery and mechanical methods common to all operations of the industrial chemist—grinding, sifting, sedimentation, filtration, centrifugal separation, lixiviation, crystallization, calcination, evaporation, refrigeration and so forth.

Starting with water, "Its Uses and Purification," it follows with 16 pages on "Fuels," in which, among other matters, coke ovens are described. The fact that "Koppers" is spelled without the final "s" probably should be charged to the proofreader and not to the distinguished editorial force. Sulphuric and nitric acid production is next considered, and then most briefly "Elements and Inorganic Compounds," with more generous attention to chlorine, iron and oxygen. "Ceramic Materials and Products" have a separate chapter, and "Pigments" and "Fertilizers" each receive suitable treatment. "Illuminating Gas" is awarded 16 pages, the allowance awarded to "Fuels," and almost as much is given to "Coal Tar and Its Distillation Products."

The petroleum industry receives some attention, but for some reason gasoline is not so much as mentioned in the chapter except on a derivative chart. Other chapters consider "Distillation of Wood," "Oil, Fats and Waxes," "Lubricating Oils," "Soap, Soap Powder and Glycerin," "Essential Oils," "Resins," "Oleo-Resins, Gum Resins and Gums," "Varnish," "Sugar," "Starch, Glucose, Dextrin and Gluten," "Beer, Wine and Liquor," "Textiles," "Dyestuffs and Their Applications," "The Paper Industry" "Explosives" and "Leather."

The book will be of value chiefly to those who have not affiliated themselves with any particular industry and who want a generalized view of the whole field. Those who have given their allegiance to some specialized form of human endeavor will want something deeper and more sufficing.

Current Prices—Materials and Supplies

IRON AND STEEL

Structural Material—The following are the base prices f.o.b. mill, Pittsburgh, together with the quotations per 100 lb. from warehouses at the places named:

	Pittsburgh	St. Louis	Chicago
Beams, 3 to 15 in.	$3.75	$4.30	$4.50
Channels, 3 to 15 in.	3.75	4.30	4.50
Angles, 3 to 6 in., ¼ in. thick	3.75	4.30	4 50
Tees, 3 in. and larger	3.75	4.30	4.55
Plates	5.00	5.55	5.50

Sheets, Plain and Corrugated—Quotations are in cents per pound in various cities from warehouse, also the base quotation from mill:

	Large Lots, Pittsburgh	St. Louis	Chicago
Black			
Nos. 18 and 20	5.30	5.55	5.70
Nos. 22 and 24	5.35	5.60	5.75
No. 26	5.40	5.65	5.80
No. 27	5.45	5.70	5.85
No 28	5.50	5.75	5.90
Galvanized			
No. 10	6.25	Premium	7.20
No. 12	6.30	Premium	7.20
No. 14	6.35	Premium	7.20
Nos. 18 and 20	6 60	Premium	7.40
Nos. 22 and 24	6.80	Premium	7.55
No. 26	6.95	Premium	7.70
No. 27	7.00	Premium	7.85
No. 28	7.25	Premium	8.00

Note—For corrupated sheets add 15c. per 100 lb. for both black and galvanized.

Pipe—The following discounts are for carload lots f.o.b. Pittsburgh, in effect Apr. 2, 1917:

Steel Inches	Black	Galvanized	Iron Inches	Black	Galvanized
	Lap Weld				
2	48%	35½%	1¼	36%	21%
2½ to 6	51%	38½%	1½	42%	34%
7 to 12	48%	34½%	2	43%	29%
13 and 14	38½%	....	2½ to 4	45%	32%
15	36%	....	4½ to 6	45%	32%
			7 to 12	44%	31%
	Lap Weld, Extra Strong Plain Ends				
2	46%	34½%	1¼	38%	23%
2¼ to 4	49%	37½%	1½	43%	29%
4½ to 6	48%	36½%	2	45%	32%
7 to 8	44%	30½%	2¼ to 4	47%	35%
9 to 12	39%	25½%	4½ to 6	46%	34%
			7 to 8	40%	28%
			9 to 12	35%	23%

From warehouses at the places named the following discounts hold for steel pipe:

	Black		Galvanized	
	Chicago	St. Louis	Chicago	St. Louis
2½ to 6 in. lap welded	50.8%	49.27%	37.8%	35.27%
7 to 12 in. lap welded	47.8%	46.27%	33.8%	31.27%

Cast-Iron Pipe—The following are prices per net ton for carload lots:

	Birmingham	Chicago	St. Louis
4 in.	$42.00	$48.15	$47.00
6 in. and over	39.00	45.15	44.00

Gas pipe and 16-ft. lengths are $1 per ton extra.

Cold Drawn Steel Shafting—From warehouse to consumers requiring fair-size lots, the following quotations hold:

	Mar. 30, 1917	Six Months Ago
Cleveland	List plus 10%	List plus 20%
Chicago	List plus 5%	List price

Track Supplies—The following prices are base per 100 lb. f.o.b. Pittsburgh for carload lots, together with the warehouse prices at the places named:

	Mill, Pittsburgh		Chicago	St. Louis
	Mar. 29, 1917	1 Yr. Ago		
Standard railroad spikes	$3.65	$2.50@2.65	$4.10	$4.15
Track bolts	5.00@5.10	3.25	5.60	Premium
Standard section angle bars	2.35@2.85	1.50@1.75	3.50	Premium

Nails—Prices per keg from warehouse:

	Mill, Pittsburgh	Chicago	St Louis
Wire	$3.20	$3.65	$3.70
Cut	3.75	3.85	4.00

Steel Rails—The following quotations are per 100 lb. f.o.b. Pittsburgh and Chicago for carload or larger lots. For less than carload lots 5c. per 100 lb is charged extra:

	Pittsburgh	Chicago
Light rails, 8 to 10 lb	$58.00	$55.00
Light rails, 12 to 14 lb	57.00	54.00
Light rails, 25 to 45 lb	55.00	52.00

Bar Iron—Prices are as follows in cents per pound at the places named:

	Mar. 30, 1917	Six Months Ago
Pittsburgh, mill	3.25@3.50	2.60
Chicago	4.00	3.25

Swedish (Norway) Iron—Price per 100 lb. in Chicago was $6.75 on Mar. 30, 1917—a rise of $1.25 in six months. In coils an advance of 50c. is usually charged.

Old Metals—The following are the dealers' purchasing prices in cents per pound:

	New York		
	Mar. 30, 1917	One Year Ago	Cleveland
Copper, heavy and crucible	29.00	23.00	28 00
Copper, heavy and wire	28 50	22.00	27.00
Copper, light and bottoms	24.75	19.00	25.00
Brass, heavy	17.75	14 00	19.00
Brass, light	13.75	12.00	14 50
No. 1 yellow rod brass turnings	19.00	14.00	17.50

MISCELLANEOUS

Portland Cement—These prices are for barrels in carload lots, including bags:

	Mar. 30, 1917	One Month Ago	One Year Ago
New York	$2 12	$1.97	$1.32
Chicago	2.16	2 06	1.41
Pittsburgh	2.16	2.06	1.41
Cleveland	2.29	2.19	1.54
Detroit	2 25	2.15	1.50
Cincinnati	2 10	....	....
Indiannapolis	2 29	2.19	1.54
Toledo	2.29	2.19	1.54
Minneapolis	2.43	2.33	1.68
Duluth	2 41	2 31	1.56
Peoria	2.28	2.18	1 49
St. Louis	....	1.95	1.45

Brick—The price per 1000 in cargo or carload lots is as follows:

	Common		Common
Chicago	06.00	Cincinnati	$9.00
St. Louis	7.00	Denver	7.50
New Orleans	7.50		

Fire Brick—Quotations on the different kinds in the cities named are as follows, f.o.b. works:

	Joliet, Ill.	St. Louis
Silica brick, per 1000	$50.50	$40.00
Fire-clay brick, per 1000	35.00@50.00	40.00
Fire-clay brick, per 1000, No. 1	.....	28.00@30.00
Magnesite brick, per net ton	135.00	.....
Chrome brick, per net ton	135 00	.....
Deadburned magnesite brick, per net ton	85 00	.....
Special furnace chrome brick, per net ton	60.00@70.00	.....

Standard size, 9 x 2½ in. The second quality is $4 to $5 cheaper per ton

Manila Rope—Price in cents per pound, delivered at cities named:

	Cincinnati	Kansas City	Denver
¾- to 1½-in.	25	26½	27 (coils)

Leather Belting—Present discounts from list in the following cities are as follows:

	Medium Grade	Heavy Grade
Chicago	45—5%	35—10%
St. Louis	40—5%	40%

Calcium Carbide—Price f.o.b. cars at warehouse points in Eastern States is 82.50 per ton for Cameo, $87.50 for Union.

Lumber—Price per M in carload lots:

	1-In. Rough, and Under		10 In. x 16 Ft.	2-In. T. and G., Dressed and Matched (10 In. x 10 Ft.)	
	Y.P.	Fir	Hemlock	Y.P.	Fir
Cincinnati	$33.00	....	....	$29.75	....
Denver	....	$21.00	$21.00	....	$22.00

	8 x 8-In. x 20 Ft. and Under				12 x 12-In., 20 Ft. and Under	
	Y.P.	Fir	Hemlock	Spruce	Y.P.	Fir
Cincinnati	$26.75	....	....	....	$21.00	....
Denver	....	$25.00	....	....	....	$25.00
New Orleans*	32.00	c38.00	....	....	32 00	38.00

*Price under "Fir" column is for cypress.

Greases—Prices are as follows in the following cities in cents per pound for bbl. lots:

	Chicago	St. Louis
Cup	6	4
Fiber or sponge	6¼	5
Transmission	6¼	5
Axle	3½	3½
Gear	5	3
Car journal (S. & F.)	4½	9½

White and Red Lead, in cents per pound, sell as follows:

	Red				White	
	Mar. 30, 1917		6 Months Ago		Mar. 30, 1917	6 Months Ago
	Dry	In Oil	Dry	In Oil	Dry and In Oil	Dry and In Oil
100-lb. keg	11.25	11.50	10.50	11.00	11.00	10.50
25- and 50-lb. kegs	11.50	11.75	10.75	11.25	11.25	10.75
12½-lb. keg	11.75	12.00	11.00	11.50	11.50	11.00
1 -to 5-lb. cans	13.25	13.50	12.50	12.50	13.00	12.50

Coal and Coke News

Washington, D. C.

Profiting by the experience of the European combatants in the present war in which it is claimed large numbers of the best engineers, chemists and metallurgists were killed in the trenches before their value behind the lines and in the munition shops had been realized, Secretary of Interior Lane has announced that the Bureau of Mines, at the request of the Council of National Defense, has begun a preparedness census of the thousands of expert technical men of the country. Twenty-five thousand letters to the mining engineers, chemists, metal-mining companies and coal-mining companies have been sent out requesting, as a matter of patriotism, that the recipients state their qualifications and experience, how and where in case of emergency they could, in their opinion, be of most service to their country and in what branches of the industry they consider themselves most proficient.

In this movement the Interior Department has the coöperation of the American Institute of Mining Engineers and the American Chemical Society, the letters to the mining engineers being signed jointly by Van H. Manning, Director of the Bureau of Mines, and Philip N. Moore, of St. Louis, Mo., president of the Institute of Mining Engineers; and the letter to the 10,000 chemists being signed by Director Manning and Julius Stieglitz, of Chicago, president of the Chemical society.

According to Director Manning, the responses will be tabulated in such a manner that, if the time comes when military authorities need certain highly specialized experts for the industrial plants engaged in the manufacture of war material, a list containing the names of the most eminent men in their line in the country will be at once available, and it will be possible immediately to engage their services as they had previously expressed their willingness to serve their country.

"Warfare today is one of materials transformed in the shortest possible time into terrible weapons of destruction and defense," said Director Manning. "It requires an unlimited number of trained technical men who know at once how to fashion these engines out of the raw materials. In fact so predominating is the need for expert technical assistance that the war in Europe has been termed an engineers' war, a chemists' war. In this country we have the technical talent, men of vast practical experience and men who have already supplied such materials as are needed in warfare. There is no question of the expert ability of the nation that gave to the world the armored battleship, the submarine, the machine gun, the airship, the telephone, and other epoch-making inventions. And there is no doubt as to the ability of the technical men to develop what other devices may be needed if the emergency comes.

"Fortunately for us, this country has unlimited supplies of the mineral and other resources necessary for modern warfare. There would be no shortage of materials to harass us and divert our attention from the real task in hand. In respect to efficient technical ability and to natural resources, this country is far better equipped than any of the countries now at war.

"What we have to do now is to be sure that we do not repeat the mistakes and blunders of some of the countries now at war. When the European conflict broke out, France in particular assembled her available manhood in the trenches, forgetting in the moment of national calamity that experts in various industrial lines would be direly needed in the industries that prepare the material for war. When she discovered her error, many men who would have been of vastly greater service to their country in the industries had been killed. This, I understand—and it was not confined to France—was a most serious handicap to the Allies in their prosecution of the war, as materials lagged behind at critical times until a new expert force had been created.

"With this proposed preparedness census of the technical men, this country will be ready to mobilize experts without delay in any of the 50 different lines at the points where they are needed. As an instance, in the manufacture of artillery and guns of all descriptions, the steel is hardened by the use of special alloys. At the request of the War Department, we would be prepared to assemble at once the recognized experts in alloys and send them to their places of duty. Or if the War Department needed tunnel builders, explosive experts, men who know about dike and levee building, the construction or the erection of machinery, or the manufacture of metals from the ores, the most representative in the United States could be procured at once.

"The information we are seeking not only goes into the qualifications of the men, but will state whether or not they are American citizens, whether they speak a foreign language and if they have had experience in foreign countries. This is purely a preparedness step and something which ought to be done irrespective of the future. I know that the mining men and chemists will respond in a patriotic manner and that we shall all feel a little more secure as a result. It is another effort toward that well-known slogan of the Bureau of Mines—'safety first.'"

Tests on Alaska Coal

With the object of quickening the industrial development of Alaska that is expected to follow the building of the Government railway there, Secretary of Interior Lane has announced that the Bureau of Mines has recently made a number of tests as to the quality of the mineral resources there with encouraging results. A quantity of lignite was shipped in water-tight sacks to the bureau from the Nenana field with the purpose of finding out whether or not it could be manufactured into briquets and made available for shipment.

According to the report just made to the Secretary by Director Manning of the Bureau, this lignite was not only briquetted successfully, but it was found to contain in this form nearly double the heating and steaming value of the original lignite.

"The bureau's experts also found," reported Director Manning, "that these briquets have between 80 to 90 per cent. the heating and steaming value of our highest grade bituminous coals. Where the price of coal is high and the difficulties and cost of transportation considerable, as in Alaska, it seems to me, from the results obtained, the briquetting of this coal deserves careful and favorable consideration. In the making of these briquets, the gas has been extracted. If this gas could be used at the briquet plant, there would still be further economic advantages." The report indicates the possibilities in the development of the Nenana coal fields through the use of the briquets on the Government railway, for the steamboat trade and for power at the mines of central Alaska.

With the same object in view, the development of Alaska industrially, the bureau recently analyzed a quantity of Alaska crude petroleum and found it to be a high grade, refinable product, containing over 30 per cent. gasoline, considerable quantities of wax and lubricants and only a moderately small percentage of asphalt. The oil sampled was one of the most valuable crudes the bureau has received from any field except the Appalachian."

Mechanical Devices Not Condemned

Mechanical devices for resuscitation have not been condemned by the United States Public Health service nor by the Bureau of Mines, as seems to be the opinion in some quarters. All matters pertaining to the advisability of the use of these apparatus in the Government service is in the hands of the Public Health service. The Bureau of Mines and the U. S. Coast Guard service simply follow the advice of the Public Health surgeons in their use. Dr. Rupert Blue, the surgeon general of the Public Health service, gives his opinion of these devices as follows:

"It is the substance of the opinion of the investigators of this bureau that while manual methods of resuscitation should be relied on primarily and cannot be supplanted by any mechanical device thus far known, mechanical means for producing artificial respiration should be available in places where accidents may occur from drowning or exposure to poisonous gases. Mechanical methods of respiration are especially indicated in cases of great relaxation, collapse of the lungs, gas poisoning and when signs of reanimation fail to appear shortly after the application of manual methods.

While insofar as actual ventilation of the lungs is concerned, mechanical methods are superior to manual, it is the opinion of the investigators that the delay incident to the application of mechanical methods at a time when every second is of value constitutes a serious argument in favor of manual methods. They therefore recommend that in all cases of submersion, or exposure to poisonous gases, manual methods should be applied without delay and let the use of mechanical respiration be decided by the condition of the subject."

A committee which investigated the lung motor for the Bureau of Mines two years ago condemned expiration produced by repeated suction of air from the lungs. This advice is concurred in by the Public Health service. In this connection, Dr. Blue says: "It is recognized that the lung motor may be used as a device for producing inspiration only, the suction stroke being dispensed with."

HARRISBURG, PENN.

The State Workmen's Insurance Fund, announced on Mar. 30 that the widows and children of the 14 miners killed by an explosion at the mine of the Henderson Coal Co., near Cannonsburg, Mar. 15, will receive approximately $35,000 in workmen's compensation from the State Fund.

Claim adjusters of the State Fund have been working on the adjustment of these claims since the day of the accident. Of the 14 men killed, 7 were between 30 and 40 years of age, and 7 between 20 and 30. Ten of the victims were married and are survived by 10 widows and 20 children under 16 years of age. All the widows and children are entitled to workmen's compensation in accordance with the terms of the Pennsylvania act. The state is working to have all agreements adjusted so that compensation payments may begin without the loss of benefits for a single payday by the widows of the victims.

The resources of the State Fund have been in no sense seriously affected by the $35,000 outlay to cover this catastrophe, according to Assistant Manager A. L. Allen. All the compensation insurance rates for coal mines are determined in amount so that the aggregate coal mine premium, including excess insurance, will afford ample protection for the State Fund, as well as for other insurance carriers against such catastrophes. The total premium income of the State Fund for this year, it is estimated, will aggregate $1,250,000.

Increased Rates Are Asked

Asking authority to advance existing freight rates 15c. per ton on bituminous coal, coke and iron ore, and to make a flat increase of 15 per cent. in all other classes of commodity rates except upon anthracite, the railroads of Pennsylvania on Mar. 31, stated their case to the Public Service Commission at a conference of state and railroad officials. This action is in line with and carrying out in the state of what was done a few days ago in Washington before the Interstate Commerce Commission.

Chairman W. D. B. Ainey of the Public Service Commission presided at the conference. He was accompanied by James Alcorn and Berne H. Evans, counsel for the commission. G. Stuart Patterson, general solicitor of the Pennsylvania R.R. opened proceedings. In asking for an increase in freight rates he stated the railroads were guided not only by the questions of justice to the stockholders and adequate service to shippers, but also the desire to have the properties placed in proper condition to meet the requirements of national defense.

To illustrate the conditions which the railroads are facing at this time, Mr. Patterson said that the Pennsylvania R.R. system, between Sept. 1, 1916, and Mar. 1, 1917, showed a decrease of $11,200,000 in net earnings, although in the same period the gross business transacted had increased $13,000,000. In these figures he stated, allowance was made for the Adams law wage payments for January and February of the present year.

The commission was also addressed by George D. Dixon, vice president of the Pennsylvania R.R. A. W. Thompson, vice president in charge of traffic and commercial development, Baltimore & Ohio R.R., and J. F. Auch, vice president and traffic manager, Philadelphia & Reading Ry.

PENNSYLVANIA

Anthracite

Pottsville—President W. J. Richards, of the Philadelphia & Reading Coal and Iron Co., sent out a circular letter on Mar. 30, to 40,000 employees of the company urging that all lands that can be cultivated be planted immediately, and offering to loan many thousands of acres of the company's land in Schuylkill and other counties to those who will cultivate the soil. Part of these tracts are located above coal mines, and it would be unsafe to erect buildings thereon, but agricultural pursuits can be followed with perfect safety. Mr. Richards who is president of the Patriotic League of Schuylkill County, says: "The need of greater production of foods during the coming year is imperative. Much land that can be made productive is not cultivated. The company urges every employee who has control of land, no matter how small, or who can secure the use of any land, to cultivate it to produce food for his own or others use. The company will arrange with any of its employees for the use of any lands it may have that are adapted for cultivation, and which are at present not needed in its mining operations. The company will, through its officers, coöperate in any helpful way with its employees who will undertake to assist in increasing the production of foods."

The Philadelphia & Reading Coal and Iron Co. has installed new electric car loaders at some of its properties in the northern part of Schuylkill County. Similar equipment is being planned for other mines of the company, with plans to adopt the system generally. One machine, it is said, handles the work of six men.

Hazleton—At the request of the Council of National Defense the big coal companies of the anthracite region are preparing lists of their employees to determine how many of them are of foreign birth and what percentage is unnaturalized. More than a score of nationalities are represented among the 175,000 workers in the hard coal field of Pennsylvania.

Centralia—The unusual spectacle of two big collieries belonging to the same company and located close together, facing serious damage, one from water and one from fire, is presented directly north of Broad Mountain. A destructive fire has been raging at Packer No. 5 colliery of the Lehigh Valley Coal Co., for several days. Just as the fire was believed to be extinguished, the flames broke out with new force, but were finally gotten under control on Mar. 30. While Packer No. 5 was contending with fire, Packer No. 4 colliery was partly flooded as a result of an accident. While the officials of No. 4 were helping to fight the fire at No. 5 a 10-in. steam column pipe at No. 4 burst. This column supplied steam for the pumps and these were shut down on account of the accident for several days while a flood, resulting from recent rains has poured into the mine. The result is that both mines, employing about 2500 men and boys, were thrown idle.

Drifton—The Lehigh Valley Coal Co., which has just finished a big tunnel at Council Ridge now plans to start another one here so as to get at beds of anthracite that have not been heretofore extensively tapped. Nothing has been done yet on the driving of the tunnel through the mountain from Hazleton to Butler Valley to drain the mines of the Hazleton Basin. Farmers have however been asked for renewals of options on land where the tunnel is to have its outlet.

Olyphant—Fire in the boiler room at No. 2 shaft of the Delaware & Hudson Co. in the middle of the night recently caused several thousand dollars of loss, and put the place out of operation. No one was hurt, and the origin of the fire is unknown.

Wilkes-Barre—The traffic on the Laurel Line system between Scranton and Wilkes-Barre was interfered with recently by a mine cave at du Pont. The track was dropped and the transfer of passenger was necessary. A force of men was immediately put to work filling in the cave.

Scranton—Numerous mine caves have occurred recently on the golf links of the Country Club. The disturbances on the club grounds are over workings of the Pennsylvania Coal Co. It is said that at the bottom of one of these caves miners may be seen at work by people standing on the surface. It is also said that some of the miners use the cave holes as a short cut to their homes after their day's work is completed.

Bituminous

Connellsville—The weekly coke production of the Connellsville region recently amounted to 368,664 tons, while shipments were 370,313 tons. This is a decided gain over the production of the previous week.

The Casselman River Coal Co. has purchased 1000 acres of coal and controls about 2000 additional acres along the Baltimore & Ohio and Western Maryland railroads along the Casselman River. The new operation which is being constructed on the property will have an output of 1000 tons daily.

Seward—New machinery has been ordered and other improvements are under way at the Robindale mines which were purchased recently from the Conemaugh Smokeless Coal Co. by E. F. Saxman of Philadelphia. It is proposed to bring the tonnage up to 300,000 tons for 1917.

Broad Ford—The H. C. Frick Coke Co. has made temporary repairs to the Rist tipple and has resumed operations at the plant. The old tipple was destroyed by fire recently.

Charleroi—Twenty thousand men employed in the mines of the upper Monongahela Valley were thrown out of employment temporarily when the No. 4 dam of the Monongahela River broke thus interfering with river shipping. The dam will be repaired at once and it is thought the mines will resume work shortly.

Johnstown—The Smokeless Coal Co. has started the opening of a new drift mine at Ferndale. The new drift will double the capacity of the present plant and also act as a drain for the No. 1 mine.

There is considerable activity among real estate dealers who handle northern Cambria coal lands. The Binder Coal Co. has purchased the Frick Sharabaugh and Strittmatter tracts south of Carrolltown, and will develop them upon a large scale. A modern plant will be established and the tracts will be developed under the name of the Green Coal Mining Co. Eck & Rody, northern Cambria operators, have purchased the old Kline plant, known as Burl No. 6 and expect to operate it upon a large scale.

The examination for mine foremen and firebosses will be held in every bituminous district next week, Apr. 10, 11, 12 and 13, in the town which is the headquarters of the inspector of the district. Two districts are located here, Sixth and Twenty-fourth. The Sixth district examination will be held in City Hall and the Twenty-fourth in Vigillant Fire Company Hall.

Punxsutawney—On account of the increased coal traffic over the branch lines from Punxsutawney into Indiana County the Buffalo, Rochester & Pittsburgh Railway Co. has asked bids on an 18-stall roundhouse, a locomotive repair shop and new yards to be built here. This will represent an expenditure of over $100,000.

Holden—The first shipment of coal was made from the new mines of the Williams Coal Co. here last week. The mines are located on the Lake Erie & Franklin R.R. About 40 miners are employed at the present time.

Indiana—A number of important coal deals have just been closed in Indiana County. Samuel Streams has disposed of a large tract in Ryne Township to W. F. Snyder for $10,090; the Penn Mary Coal Co. has purchased the Bennett tract in Pine Township for a fancy sum, and Peale, Peacock & Kerr has purchased the Amond tract in Cherry Hill Township for $26,586.26.

Brookville—Fire of unknown origin recently destroyed a building belonging to the Highland mine of W. H. Fleming near Corsica. The loss included clothing, tools and other mining supplies as well as a lunch room which occupied part of the building.

Brownsville—An inquest into the death of four coal miners, killed in an explosion in Isabella mine of the Hecla Coal and Coke Co., on Mar. 18, was held here on Mar. 30. The verdict of the jury absolves the company for all blame for the accident, but recommends that the fireboss be censured for not reporting the presence of gas in the mine.

WEST VIRGINIA

Charleston—Coal miners are badly needed in W. Va., and many letters are being received by the department of labor from operators asking for assistance in finding men to work in and about the mines.

Operators in the Kanawha field that maintain offices in Charleston have given liberally to the local Y. M. C. A. Approximately $10,000 has been subscribed by these operators to make various improvements in the swimming pools, gymnasium, and the addition to the Turkish bath department. It is claimed by the operators that better service is received from their office men who belong to the association and take advantage of the athletics.

Fairmont—Employees of the Consolidation Coal Co., who are members of the National Guard, and who have been called out for duty, have been given their regular pay and the assurance that their positions will be waiting for them when they return. A large number of the members of the local companies are miners and other employees of this corporation.

Wellsburg—The second bridge over Buffalo Creek for the branch of the Pennsylvania Railroad Co. has been completed, and trains may now proceed almost to the new McKinley coal mines. It is stated that coal will be shipped by rail in two weeks.

Huntington—Notwithstanding the opening of many new mines in West Virginia, as well as the reopening of abandoned operations, within the first quarter of the year there has been little if any more coal produced this year than in the corresponding period of last year. This is attributable largely to the shortage of cars.

ALABAMA

Birmingham—The Beltona Coal and Mining Co. has purchased the property of the American Coal Corporation which has been in bankruptcy since last August. In addition to resuming operation at the present opening, a new opening will be made, increasing the output to about 1000 tons daily. Judge C. B. Teasley of Montgomery is president of the company, C. P. Rogers, Jr., and W. A. Rogers are his associates. The company is a $700,000 corporation. In purchasing the property the new company assumes all indebtedness. The bonded indebtedness is $500,000, with $314,000 accrued interest, and an unsecured debt of $200,000. The sale was consummated by Judge Dye Dryer and Priestly Toulmin, acting trustee.

KENTUCKY

Harlan—Judge W. W. Lewis and associates have sold their holdings in the East Harlan Coal Co. to J. F. Bippers and associates of Huntington, Ind. J. L. Smith, superintendent of the company, retains his interest and will continue as an officer of the company.

The Catrons Creek Mining Co., which recently opened mines on Catrons Creek, has been sold to S. W. McComb and associates of Jellico, Tenn., and is now being operated under the name of the McComb Coal Co. S. W. McComb, president and general manager of the company, will have headquarters at Harlan.

Paducah—Members of the West Kentucky Coal Operators Association held a recent meeting here to consider ways and means of remedying a car shortage on the lines serving their mines. The car supply has been about 50 per cent. of the rated capacities of the operations. One of the objects is to provide the Illinois Central with the coal it needs for trains, shops, etc. No ferences will be held. Operators are hoping to definite action was decided on but other consee government action designed to improve and relieve the situation.

Frankfort—The proposal to put a license tax on coal in Kentucky is being discussed with much vigor in the House of Representatives. There are at least two separate bills before this body, one by Representative Howard, which would fix a license tax of 2c. on every ton of coal mined in the state, and the other, by Representative Crowe, providing for a tax of 1c. on each ton mined. The first bill has been in committee for some time and Representative Howard at a recent session undertook to order it called out, the House finally tabling his motion. Representative Perry, chairman of the committee on Revenue and Taxation, which has been considering the bill, stated that the committee had provided for a hearing of coal operators, but added that the committee had almost unanimously decided not to report the measure at this time.

Whitesburg—The W. H. Turner Coal Co. of which W. H. Turner is manager, is starting the work of development here. At first the new company will meet the demands of the local trade, and later mine export coal.

The coal tonnage of this section is to be considerably increased during the next few months due to the large number of new operating companies coming into the territory; also because of the increases being made by old companies.

A party of officials of the Mineral Development Co., a Philadelphia corporation, owning extensive coal lands in the Colly Creek and other sections of the coal fields above here are making a tour of inspection of their properties. It is understood that development of these properties will be undertaken at once. A five-mile branch of the Louisville & Nashville R.R. is to be extended up Colly Creek, with yards at its mouth in order to facilitate coal shipments from the Elkhorn and Boone's Fork coal fields.

Fleming—The Acme By-Product Coal Co. near Neon has awarded contracts for the erection of 50 miners' houses in the new town of Acme. A large number of men are doing the grade work, and opening of mines. It is planned to make the first coal shipments within 30 days. The building of a commissary, coal tipples, etc., is now going on.

OHIO

Bellaire—Coal mines in Bellaire and vicinity are working better now than for some time. Many of the operations in the vicinity of Bellaire are working almost full time, and the car supply is decidedly better.

Mineral—Work is going forward on several projected operations in this vicinity, notably that on the McAdoo farm and at the Jackwater Mine, which is being reopened by a company from Chillicothe, Ohio. J. R. Stout, owning coal land near here, will make tests shortly to determine whether it is worth while to open a mine.

INDIANA

Terre Haute—The annual meeting of the Indiana Bituminous Coal Operators Association was held Mar. 28, at the Chamber of Commerce, Terre Haute. Executive officers of the association were re-elected for the coming year. W. J. Freeman is president, M. L. Gould, vice-president, and Philip Penna, secretary-treasurer. A large part of the membership of the coal men's association from Vermilion, Parke, Greene, Clay, Sullivan, Vigo, Knox, Gibson, Pike, Vanderburg and Warren counties was present. The agitation of the miners in this district for an increase in wages was discussed. The operators refuse to participate in any way in any movement designed to set aside the interstate joint agreement. According to Secretary Penna, Mr. Penna said the Indiana operators had not been approached by Ohio operators on the matter of a conference of the central field to consider the question of wages.

ILLINOIS

Pana—The Chicago & Eastern Illinois Railroad Co. has closed a 1-year contract with the Pana Coal Co. for the entire output of its Mine No. 1, effective Apr. 1. This is the largest contract ever given one company in this section of the state. It means continuous night and day operation of the mine and the employment of about 300 men. The Pana Coal Co. is preparing to reopen its Mine No. 2, which has been abandoned for some time. It will give employment to about 200 men.

Rutland—Charles S. Gibson, formerly of Streator, has purchased the Rutland mine of the Hokes Lyon Coal Co., which was formerly operated by Mrs. Emmerson Hokes but has been under lease for the past two years to Bent Bros., of Oglesby. Gibson traded property in the northern part of Illinois for the mine. He will move here and operate it.

Bush—In addition to shaft No. 2, which the Western Coal and Mining Co. is now constructing, the tipple will be started in the next 60 days on shaft No. 3 west of Royalton. This perhaps will be located just over the county line in Jackson County. It will operate in the No. 6 seam. This will make three mines of the

Western Coal and Mining Co. in this immediate vicinity.

Springfield—Railroads of Illinois are given the right, in an order issued by the State Public Utilities Commission, to make an advance of 5 per cent. in the commodity rate on coal moving intra-state in Illinois, provided that the maximum increase shall be 5c. a ton. The rule exempts East St. Louis, Alton and intermediate points, which were granted the right in 1905 to make the increase. The commission also allows advances in the maximum scale of rates on coal as follows: For 25 miles or under, 1 per cent.; for 50 miles or over 25 miles, 2 per cent.; for 75 miles or over 50 miles, 3 per cent; for 100 miles or over 75 miles, 4 per cent.; for more than 100 miles, 5 per cent. The ruling is in a measure a compromise on demands made by the railroads of the state. They asked permission for an increase of 5c. a net ton to all intra-state destinations except to the east bank of the Mississippi River north of and including Hamilton, to which destinations a 10c. increase was asked. They also wanted to advance 5c. a ton the proportional rates to Chicago and other junction points to which no through rates are in effect.

NORTH DAKOTA

Lignite—Some new equipment has been placed in the Haynes coöperative coal mine at Lignite. A loading tipple and a small locomotive to haul the coal cars are among these improvements.

Personals

Walter H. Wood, mechanical engineer and expert in combustion, has become associated with the Combustion Engineering Corporation of New York City.

J. E. Pettit, state coal mine inspector, Salt Lake City, Utah, has resigned his position after many years of service. His successor will be announced later.

Warren R. Roberts, and family, president of the Roberts & Schaefer Co., have just returned to Chicago after a month's sojourn in Pasadena and Los Angeles.

I. W. Albertson of Latimer, Penn., chief electrician of the Pardee collieries there, has resigned his position and will enter the Methodist ministry at Beach Haven, Penn.

Charles Ways, chemist at the Semet-Solvay coke plant at Dunbar for some time past, has recently resigned his position to accept a similar one with a McKeesport firm.

William Madill of Johnstown, Penn., has been appointed superintendent of the Meco mines near Indiana, of the Meco Coal Co. to succeed Jes M. Lutman who resigned recently.

Charles Hagenbuch, formerly district mining engineer for the Consolidation Coal Co., located at Clarksburg, has been appointed superintendent of Mine No. 25 near Clarksburg.

Luke Murray, formerly superintendent of Mines Nos. 25 and 29 of the Consolidation Coal Co., near Clarksburg, has been transferred as superintendent of Mine No. 84 at Hutchinson, W. Va.

David Blair of Bilvia, Ky. has accepted a position as chief engineer for the Consolidation Coal Co. in its McRoberts plant at McRoberts, Ky. Mr. Blair was formerly with the Blackberry Coal Co. in Pike County, Ky.

Ray M. Ansell, formerly chief electrician for the Vesta Coal Co. near California, Penn., has moved to Punxsutawney to become chief electrician of the Adrian mines of the Rochester & Pittsburgh Coal and Iron Co.

R. **P. Davies**, mine foreman for the Brush Creek Coal Mining Co. at Homer City, Penn., has been promoted to superintendent of the Luciusboro mines at Luciusboro, Penn. He succeeds W. K. Ray who resigned.

John H. Blair of Colly, Ky., who for 15 years has been doing engineering work for the different coal companies in eastern Kentucky, has accepted a position as chief engiher for the Big Sandy Coal Co. with headquarters at McVeigh, Ky.

S. S. Mikesell, for many years connected with the Mining Department of the Chicago, Rock Island & Pacific Railway Co., has been elected vice-president and treasurer of Mikesell Bros. Co., with office at 178 North La Salle St., Chicago.

J. S. Devore, new chief deputy and safety commissioner of the Ohio Mining Department, is expected to assume his new office early in April. All of the details have not yet been completed for the change from Mr. Pritchard to the new incumbent.

George W. Evans, engineer for the Mill Creek Coal Co., at the New Boston colliery, has tendered his resignation, in order to take a position in the western part of Pennsylvania. He will be succeeded by Evan W. Owens, of Wilkes-Barre, who has been employed as engineer for the Wyoming division of the Lehigh Valley Coal Co.

Thomas G. Fear has resigned his position as superintendent of the Bayview coal mine of the Tennessee Coal, Iron and Railroad Co., near Wylam, Ala., to accept the position of general superintendent of the recently acquired coal operations of the Inland Steel Co., at Indianola, Penn. These properties are located on the Allegheny River, a short distance above Pittsburgh.

H. J. Meehan, general superintendent of mines for the Cambria Steel Co., was reecntly appointed general superintendent of the Union Coal and Coke Co., with offices in the Fulton Bldg., Pittsburgh, Penn. This company has just completed the purchase of the Pittsburgh-Westmoreland Coal Co., and the Dunkirk Gas Coal Co., and Mr. Meehan will have direct charge of all these operations together with the Marianna property acquired last fall. W. M. Chase, who has been assistant to Mr. Meehan at Johnstown, will hold the same position with the new company.

Obituary

Daniel A. Wiest, for 28 years superintendent of the Philadelphia & Reading Coal and Iron Co.'s North Franklin colliery, died on Mar. 26. He was 68 years old and prominent in local banking circles.

George P. King, aged 58, superintendent of the Sunnyside mine of the Brydon Coal Co., at Hardman, W. Va., was instantly killed by an engine in the Grafton yards of the Baltimore & Ohio R.R., recently. Mr. King is survived by his wife and eight children.

C. V. L. Bute, aged 54, a well-known coal operator of Uniontown, Penn., died recently. Mr. Bute was interested in several large West Virginia coal companies, and was a director of the Buckhannon River Coal Co. and the Fink Coal and Coke Co. He also had an interest in the Masontown coal field in West Virginia. He is survived by a widow and one daughter.

George W. Schluederberg, aged 74 years, general manager of the Pittsburgh Coal Co., died Apr. 1 at his home in Pittsburgh. He had been ill five days with pneumonia, and until stricken had actively filled an important place in Pittsburgh's industrial field. He was born in Philadelphia, but since the age of 2 had resided in Pittsburgh. He became general manager of the Pittsburgh Coal Co. in 1900, when that company was formed. He is survived by a son, two brothers, and two sisters.

William McIntyre, formerly superintendent of the Battle Creek Coal and Coke Co., Orme, Tenn., died recently at his home there, at the age of 64 years. He was born in Ayr County, Scotland, coming to this country in 1881, locating in Pennsylvania where he began work as a coal miner. He later came to Tennessee. He was a close student of mines and mining conditions. His keen analysis of conditions and his demonstrated ability as a worker and adviser soon related him prominently with some of the best companies of that state. He was a man of exemplary habits and with much force of character. He was a great church and sundayschool worker and was always alive to the betterment of the conditions of those around him. He inaugurated a system of taxation in several of the mining camps of the state, enabling them to have long terms of school with good teachers. He leaves a large family.

Industrial News

St. Louis, Mo.—The Crown Coal Co., with offices here and operating the mine at Winkle, Ill., is arranging to open a distributing office in Chicago.

Bluefield, W. Va.—The Battelle Coal Co., recently incorporated by Fairmont business men, has purchased 300 acres of Pittsburgh coal in Monongalia County. The price paid was $400 per acre.

Pittsburgh, Penn.—Randolph-Means Co., consulting engineers of Pittsburgh, are in charge of the electrification work for the W. R. Johnson Coal Co. at Smithers, W. Va. When the improvements are completed this will be one of the best equipped mines in the state.

Birmingham, Ala.—The Tennessee Coal, Iron and Railroad Co. has just purchased several thousand acres of coal land in the southwestern part of Jefferson County. The exact amount involved in the deal has not been given out, but a check for $370,000 changed hands in the transaction.

New York, N. Y.—The Bradford-Ackermann Corp., recently formed by A. H. Ackermann and C. C. Bradford, with offices in the 42nd Street Building, announce that it has made arrangements with Ashton, Laird & Co. for the sole selling rights of the "Astra" high-temperature gas apparatus and oxygen-welding appliances.

Whitesburg, Ky.—The Postal Telegraph Co. is rapidly extending its lines from Jackson to McRoberts, 103 miles penetrating the rapidly developing Kentucky River and Elkhorn coal fields —now becoming an industrial and commercial section due to the development of the extensive coal fields. Coal-mining interests will be well served by these lines.

Whitesburg, Ky.—Contracts are being awarded on an important 8-mile extension of the Louisville & Nashville R.R. from Seagraves Creek to Kilday, Ky., in the Harlan County coal fields destined to become an important coal producing section. Ten thousand acres were purchased on the route a few days ago all of which will be opened for development at once.

Jefferson City, Mo.—The Missouri State Supreme Court has just reversed and remanded the railroad rate case which has been before the court for several months and which was authorized by the Public Service Commission 16 months ago. New rates will be effective in the next two months. This decision gives a general increase in freight rates of practically 5 per cent., excepting on fuel.

New York, N. Y.—About 200 members of the wholesale and retail coal trade have organized for drilling purposes under the leadership of Harry T. Peters, of Williams & Peters, No. 1 Broadway. The members of the organization which will be attached to the Home Defense League, of which Mr. Peters is a Deputy Commissioner, will be drilled in the use of patrol boats, tugs, barges and fast-cruising motor boats.

Chattanooga, Tenn.—The sale of the property of the Dayton Coal and Iron Co. to Francis C. Cary, of Minneapolis, and others, has been ratified by the creditors of the bankrupt concern. The purchaser agreed to pay $400,000, $50,000 cash, and the deeds are to be delivered when the purchaser expends $100,000 on improvements to the plant at Dayton. The property includes two iron furnaces and large bodies of coal and iron lands.

Pittsburgh, Penn.—Plans are being made by the Bureau of Mines to erect a new group of buildings at the experimental coal mine near Pittsburg. In addition to an office building, modern structures will be erected for housing the apparatus needed in the explosion tests which are being made. The explosive laboratory will not be moved to the experimental mine. This laboratory will be housed in the new building at Pittsburgh.

Indianapolis, Ind.—The Middle West will never again suffer from a coal famine similar to the one of this year, according to investigators of the Public Service Commission. Heads of several of the traction lines of Central Indiana are making preparations to haul coal from the Indiana fields to big manufacturing plants. The increased interest in waterways will also result in a greater amount of coal being transported from Kentucky coal fields on the Ohio River.

Brownsville, Penn.—Charles A. Carmack, a well-known chemist of this city, it is reported has discovered a process of making bituminous coal, which has overturned all of the accepted theories regarding the origin of coal deposits, according to recent experiments. The new coal is made under a heat of 1000 deg. F., by superheated carbon. By the use of water he can also produce a substance identical with the roof slate. Experiments will be made before college and government chemists at an early date it is said.

Murphysboro, Ill.—On and after Apr. 1, the corporate name of the Southern Illinois Machine and Foundry Co. will be changed to the Egyptian Iron Works. This change was decided upon after careful consideration, and is believed to be in the interest of all concerned. The personnel of the officers and management of the business will remain the same. The present quarters of this firm have been outgrown, on account of the large increase of business, and it is believed that it will be necessary to seek a new location. The erection of a new foundry building and car shop is under consideration. This building will be made necessary for the manufacture of mine cars and other mining equipment of all descriptions.

Columbus, Ohio—The question of holding a convention by the Michigan-Ohio-Indiana Coal Association will be decided by a referendum vote among the members which are scattered throughout the three states. Such was the action taken at the meeting of the executive board held in Cleveland last week. Some of the officers doubted the wisdom of holding an annual meeting during the summer months and did not want to take action until the rank and file of the membership gave their approval. As a result Secretary B. F. Nigh will send out blanks asking for expressions of opinion on the question. It is the first time such action has been taken but owing to present unsettled conditions and the consequent disruption of the coal trade the referendum was advised.

St. Louis, Mo.—Projects for a revival of river freight traffic between St. Louis and New Orleans and between St. Louis and St. Paul are being simultaneously pushed. The barge company which began business last year between St. Louis and New Orleans with one self-propelled barge is having two more built. A $200,000 dock has been built at St. Louis and docks are projected at other river cities. Capitalists of St. Paul and Minneapolis have formed the Twin City Nevigation Co. to establish a barge line to St. Louis. The company expects to begin with 18 barges, to be towed in strings of six by tugs. Iron ore will be carried down and coal from Illinois will be carried back. Connections at St. Louis with lower Mississippi and possibly Ohio River points are being considered.

Market Department

GENERAL REVIEW

High prices, heavy demand and many uncertainties the dominant note of the anthracite trade. Bituminous buyers going slower but situation tense. Lake shipments expected to stiffen up prices soon. Difficulty in fixing contract prices.

Anthracite—Perhaps never before in the history of the anthracite trade has the coal year opened with conditions so mixed. Unexpected discounts and increases of all descriptions and readjustments in freight rates, not to mention the sudden acute turn to our foreign relations as regards the World War, have all developed with a rapidity that has made it almost impossible to keep pace with. Uncertainties and confusion rule generally in both the retail and wholesale departments, and it is a time to adopt the most conservative measures and proceed cautiously. The big companies made heavy shipments during the closing period of the old circular, with the result that dealers now have considerable tonnages of this high-priced coal on hand, on which the consuming interests will naturally expect the April discount. Furthermore, the retailers cannot accept unlimited business at the discount, for the reason that the producers will not guarantee shipments at these figures.

Bituminous—There has been a further easing up in prices, due to a tendency on the part of the buyers to go slower, an improvement in transportation facilities, and a growing feeling that the bottom of the decline has not yet been reached. Pending a readjustment of conditions to meet the new situation in our foreign relations, it is to be expected that the market will be very mixed and unsettled. The commandeering of a very large proportion of the coastwise shipping facilities, and a possible heavy call upon the coal men for military service, are two important issues the industry may now be called upon to face at any moment. One of the important developments occasioned by the abnormal prices for bituminous coal is a constantly increasing tendency to substitute the steam prices of anthracite. Increasing wage scales has made it necessary for operators to make as many as three and four distinct advances on their contracts made as late as December and January. The outlook is for continuously unsettled market for an indefinite period.

Lake Market—The Pittsburgh district market is unsettled, having eased off on an improvement in the movement, and later stiffening up again, when some of the large steel interests suddenly went into the market for a heavy tonnage of spot coal. Some consumers have carried over considerable high-priced coal, which has not placed them in a receptive mood for further purchases. A more plentiful supply of natural gas in some of the big industrial regions will also have a tendency to restrict consumption. However, the opening of Lake shipments is beginning to stiffen up prices, while there will also undoubtedly be a heavy early demand for storage coal. Negotiations on new business for the next year continue as mixed as ever, both buyers and sellers being very cautious about committing themselves. The current spot market, though abnormally high, is still regarded by the operating interests as substantially below what the average for the next twelve months will show, but prices are still sufficiently high to make sellers very reserved about any long-term commitments.

Middle West—The domestic demand from consumers has practically disappeared, and prices are notably easier, though there is a very considerable tonnage moving into the dealers' bins for storage purposes. In spite of the improved weather conditions, transportation has not been much better, and cars continue scarce, with restrictions as to movement still in force. Some of the April circulars show increases of 75c. to $1 above what was expected. The very strong market and favorable outlook, together with a rather alarming increase in mining costs from various causes, continues to make the producing interests very uncertain as to prices on 12 months' contracts, though buyers are exerting pressure to get their requirements covered. The Burlington R.R. is understood to have covered 2000 tons of Franklin County coal per day for one year at $1.75 per ton for mine run.

A Year Ago—Anthracite offered at concessions, and uncertainty is the predominating note. Bituminous weaker, and hinging largely on the labor conferences. Exports heavy. Lake opening delayed. Middle Western situation dull, and large number of mines suspending operations.

Comparative Average Coal Prices

The following table gives the range of mine prices in car lots per gross ton (except where otherwise noted) on 12 representative bituminous coals over the past several weeks and the average price of the whole group for each week:

	Year Ago	Apr. 7	Mar. 31	Mar. 24
Boston				
Clearfields	†$1.40@1.90	$4.50@5.25	$4.00@4.25	$5.75@6.00
Cambrias and Somersets	†1.60@2.10	4.90@5.50	4.90@5.50	5.25@6.00
Pocah. and New River[1]	2.75@2.85	5.75@6.00	5.50@6.00	7.00@7.25
Philadelphia				
Georges Creek (Big Vein)	*1.90@2.00	5.25@5.50	5.75@6.00	6.25@6.50
W. Va. Freeport	1.30@1.35	4.75@5.00	4.75@5.00	5.50@5.75
Fairmont Gas mine-run	*1.35@1.45	4.50@4.75	5.00@5.25	5.25@5.50
Pittsburgh (steam coal)[2]				
Mine-run	1.15@1.25	3.25@3.50	3.50@3.75	3.75@4.00
2-in	1.25@1.40	3.25@3.50	3.50@3.75	3.75@4.00
Slack	1.10@1.15	3.25@3.50	3.45@3.55	3.70@3.80
Chicago (Williamson and Franklin Co.)[2]				
Lump	*1.40@1.50	3.50@3.75	3.75@4.00	3.75@4.00
Mine-run	*1.15@1.25	2.95@3.05	3.00@3.25	3.00@3.25
Screenings	* .90@1.00	2.95@3.05	2.75@3.00	2.75@3.25
Gross average[3]	*$1.44@1.60	$4.07@4.36	$4.20@4.44	$4.64@4.94

Gross Averages	
Nov. 25	$4.80@5.33
Dec. 2	4.71@5.17
Dec. 9	4.69@5.15
Dec. 16	4.48@4.90
Dec. 23	4.67@5.08
Dec. 30	4.73@5.19
1917	
Jan. 6	5.16@5.53
Jan. 13	4.74@5.11
Jan. 20	4.54@4.98
Jan. 27	4.64@5.03
Feb. 3	4.66@4.86
Feb. 10	4.70@4.95
Feb. 17	4.67@5.04
Feb. 24	4.95@5.29
Mar. 3	5.10@5.48
Mar. 10	5.36@5.61
Mar. 17	4.80@5.19

[1] F. o. b. Norfolk and Newport News. [2] Per net ton. [3] The highest average price made last year was $4.80@5.33 made on Nov. 25. * Price lower than the week before. † Price higher than the previous week.

BUSINESS OPINIONS

Iron Age—The stirring events of the week have put ordinary trade considerations in the background. But leaders in the steel industry, the Government's main war resource, have been busy finding ways to put their product and the best service of their plants at the country's disposal. There was further conference in New York Tuesday between the steel manufacturers' committee and the metals commissioner of the Council of National Defense. It is probable that the Government will buy in the near future for its own wants and those of shipyards which are to do its work, 500,000 tons of plates, shapes and bars. Substantial concessions are to be made from current prices, but the proposal to take a 10-year market average was not adopted, as that would represent less than cost to companies not owning their own ore and coal.

Dun—The strong position of finance, commerce and industry is demonstrated by the stability of the leading markets, and it is noteworthy that impending foreign events have not lessened confidence in any quarter. Everywhere there are clear manifestations of wholesome conservatism and caution, and the general avoidance of overextension in ligitimate undertakings affords the best assurance of sustained economic progress. Commercial failures this week are 279, against 294 last week, 269 the preceding week and 381 the corresponding week last year.

Bradstreet—Better weather, the approach of Easter, large government buying for army and navy account and the heavy purchasing power of the public at large constitute the stimulating features which make for exceptional activity in nearly every line of trade and swell the total volume at most centers above last year's levels. At a good many markets there is talk of continued conservatism as to far future buying, but this is absolutely absent in the iron and steel trade, which notes new high levels of prices reached, and rarely noted in cotton and woolen goods, which are strong, with an upward tendency for near-by needs, and supported by the strength of the raw materials, so far as the future is concerned.

Dry Goods Economist—Practically all lines have been firm and active. On some goods retailers have had difficulty in obtaining acceptance of orders for immediate delivery. Few buyers are personally in the market, as retailers are now giving all their attention to reaping the harvest of Easter trade.

The American Wool and Cotton Reporter—Considerable activity has been noted during the week under review in scoured wools, fleeces and pulled wools. The demand for high quarters and above has been strong, presumably due to the U. S. Government needs. The three-eighths blood grade is particularly firm, owing to the fact that this is the kind of wool largely wanted for uniforms and blankets.

Marshall Field & Co.—Wholesale distribution of dry goods for the current week has been in larger volume than in the corresponding period of a year ago. Road sales for both immediate and future delivery are running ahead of last week and show a good margin over the same period of 1916. Customers have been in market in larger numbers. Collections are normal. The market on domestic cottons continues to advance.

CONTRACT PRICES

Boston—Producing interests are even more cautious, if anything, about commitments, and buyers are finding it almost impossible to cover their annual requirements, though some are succeeding in getting a portion of these covered. Some of the producing interests are agreeing to furnish limited tonnages at the market price at the time of delivery.

New York—Producing interests are refusing to commit themselves in every case for beyond 50% of their requirements, while some are holding 75% of their tonnage free, and a great many are refusing entirely to sell coal far ahead. It is becoming clear that a great many buyers will have to confine their purchases to the open market. A small tonnage for delivery during the summer is reported to have been closed at $3.75 at the mines, and another lot of high-grade coal at $4.25. On bids for some city business, involving a small quantity of semi-bituminous coal, quotations ranged from $7.15 to $8.50, depending upon point of delivery.

Pittsburgh—With prices continuing at extraordinary high levels at this time when the market is usually headed for the low point of the year, operating interests are naturally adverse to committing themselves for any considerable tonnages, while buyers on the other hand are equally reserved. As a result, there is practically no contract market, though some gas coal has been covered at $3.50. Prices are tending toward higher levels, however, and there is practically no bidding for steam coal at this figure.

Buffalo—Both buyers and sellers are becoming uneasy over the situation, because so little tonnage has been covered with contract.

Cleveland—Several contracts for Pittsburgh No. 8 coal have been closed at prices ranging from $2.50 to $3, and it is understood that bunker fuel contracts will be $5 on coal loaded at dumping machines, and 15c. additional when loaded from lighters. The opening price on cargo coal is quoted at $4.25 f.o.b. vessel.

Louisville—It is understood that the minimum figure quoted on new contracts is $3. The situation is very mixed and dependent upon so many uncertainties that negotiations are being conducted very cautiously.

Chicago—Uncertainties as to prices, and also as to the possibilities of making deliveries, due to restricted labor and car supply are causing the producing interests to delay committing themselves, particularly for any appreciable tonnages. The very rapid increase in cost of mine supplies is also a factor in making it difficult for producers to fix their prices.

St. Louis—The output of the T. C. Keller mine in Franklin County, involving about 2000 tons per day, is understood to have been sold to the Burlington R.R. for the next 12 months at $1.75 per ton for mine-run coal. Contracts on Nos. 2, 3, 4 and 5 steam sizes from this field, are being made at around $1.85, with $2.35 for grades above No. 5. Contracts involving several hundred cars of Mt. Olive coal are understood to have been closed, payments to be made monthly at the ruling figure during that period.

Atlantic Seaboard

BOSTON

Pocahontas and New River prices show very little change. Practically all the agencies decline to take further contracts. Dispatch fair. Pennsylvania grades were firmer on account of labor uncertainty, but now relax somewhat. Anthracite situation for New England rather mixed.

Bituminous—Spot prices at Hampton Roads are about on the same level as a week ago. Car-supply and movement are noticeably improved on the Virginia railroads. The demand is less urgent for prompt coal and fewer shippers are themselves in the market to get steamers cleared. At the same time even the smaller agencies are extremely cautious about commitments, and it is doubtful if today Pocahontas or New River coal could be bought at much if any less for delivery f.o.b. through the season than at present spot quotations. A few f.o.b. contracts still remain to be closed, the buyers having taken the position that with transportation in hand they would be able to trade more advantagously in April than hitherto. It is possible, however, that they have overstayed. The immediate future of Hampton Roads prices is hard to forecast, so much depends upon the attitude of the Government and the supply of boats for coastwise movement.

There is very little easing up in prices locally. The Boston retail dealers advanced prices on bituminous Apr. 2, from $8 to $9 per net ton delivered in teams, giving high water freights as the immediate cause. The new figure is subject to change without notice and reflects the condition of the wholesale market. Prices on small lots for inland delivery maintain their recent levels, but for cargoes there is less inquiry. Those usually best informed feel that this is due more to the approach of warmer weather than to any assurances of better supply. Receipts are no better, and buyers are only hoping against hope when they postpone purchases. Only a fair grade of Pennsylvania steam is quoted at $10.50 f.o.b. vessel Boston and Pocahontas and New River at $11@11.25. A small tonnage at these prices has been shipped to the eastward to relieve distress at one or two points.

Sales agents everywhere are most careful about entering into obligations. Buyers who did not cover their contracts in December and January when coal factors were willing to close at what then seemed extreme prices, find it now next to impossible to get taken care of on an annual basis. Several distributors have materially reduced the amount they will give customers of several years standing, and certain others will only commit themselves to furnish coal "at the market price" and then only if conditions permit. A coal contract this year is something fearful and wonderful.

A few buyers farther along the coast are just beginning to realize the difficulty of getting forward any supply of steam coal. The first signs of a rush to get covered on anthracite in place of soft coal to heat public buildings, etc., are already observed. This is bound to get more pronounced as the season advances.

Today the outlook is good for continuously unsettled conditions in the Hampton Roads coals. Few will be inclined to speculate and the shippers will pass along the risk so far as possible to the consumers at this end. 1917 is pretty certain to prove a strain on all concerned.

The Georges Creek shippers are still negligible factors in the coastwise market so far as new business is concerned. Receipts of this grade continue very light, but such deliveries are closely confined to last season's contracts and likely to be so for months to come. No prices are made at any point and apparently there is no expectation of making any.

Quotations on the Pennsylvania steam grades have see-sawed more or less since a week ago. Local difficulties over wage scale have reacted on the spot market, and for a few days practically no options were given. One day the labor situation got so acute that $8@9 was predicted. At this writing the conferences are not yet over and what quotations reach this territory are mostly on the high volatiles from the Pittsburgh region. Some operators are advising customers of the third and fourth advances because of the wage increases on contracts made in December and January.

Meanwhile all the producing interests are hard put to it to meet even the most urgent demands. Government requisitions certainly are in this class and the possibilities are serious.

All-rail movement is slow again, and consumers whose old contracts have expired and whose new ones are not yet in operation are renewing their interests in the market.

Bituminous at wholesale is quoted about as follows, f.o.b. loading ports at points designated per gross ton:

	Clearfields	Camb. and Somerset
Philadelphia	$5.75@6.50	$6.15@6.75
New York	6.00@6.75	6.40@7.00
F.o.b. mines	4.50@5.25	4.90@5.50
Alongside Boston (water coal)	8.00@8.75	8.50@9.00

Pocahontas and New River are quoted at $5.75@6 f.o.b. Norfolk and Newport News, Va., for spot coal, and $10@10.50 on cars Boston or Providence for inland delivery.

Anthracite—The Philadelphia & Reading Coal and Iron Co. is so far the only producing company to issue a comprehensive price circular in this market, and even its quotations are not so comprehensive as in other years. Broken and pea sizes are not quoted publicly thus far and further notice has been given that water shipments are hereafter to be made f.o.b. shipping port. On such coal as is delivered in Reading barges the water freight will fix the price and the cargo in each case will be at the risk of the purchaser or consignee. This is a radical departure on the part of the largest source of supply for Tidewater New England.

Alongside prices are likely therefore to be uneven this season. The outlook is poor for anything like normal requirements being shipped here by water and a very largely increased demand is sure to obtain all-rail. It is hard to see how any Tidewater deficiency can be made up in this way with conditions as they are, but surely dealers will have to bestir themselves to get supplied in either direction.

Small tonnages of "independent" coal continue to be offered. A few of these shippers have access to company barges and are in position to sell limited quantities on delivered prices not much in excess of the March circular. Most retailers are beginning to realize how dubious is the prospect.

NEW YORK

Anthracite buyers marking time. All companies have not yet announced new prices but most sellers are granting the 50c. discount. Labor troubles look serious in the bituminous fields. New York Tidewater prices easier. Railroads buying heavily.

Anthracite—The market took a sudden spurt on Tuesday. Demand increased rapidly and shippers were able to dispose of independent product at premiums as high as 25c. Pea coal was included in the demand and it was believed there was less than 500 tons of this size available. Dealers are advising customers to lay in their supply of winter fuel early. The small sizes were in good demand and prices were stiff.

It is becoming more apparent that the operators do not intend to tie up their supply of steam coals in contracts. Operators are slow in making public their new tidewater prices for pea and buckwheat and some of those who have already done so say they have none to sell.

The usual printed announcement from the operators has not, as yet, been generally transmitted to the trade, and it is likely that some of the larger middle houses will not send them out this year.

There has been no hurry on the part of retail dealers to buy. The companies have been doing a maximum business for several months and some of them are understood to have orders ahead to carry them into the middle of next month. What new orders are now accepted are taken subject to price at the time of delivery. Most of them received large stocks of company coal in March, and considerable of this was in their bins at the beginning of this week. However, demand was brisk and independents are getting premiums of from 10 to 20c. per ton for the domestic coals, and more for pea and the smaller sizes, when they can guarantee quick deliveries.

Production is not heavy due in part to poor car supply, and the mines were nearly all idle on Monday owing to the observance of the 8-hour day which the hard coal miners won in their last wage contest with the operators.

The steam coal situation is easier but stocks are low. Contracting is slow and it is the belief among the trade that the producers will refuse to tie up more than a small percentage of their output.

Bids opened a few days ago for furnishing one month's supply of coal for several city departments indicated prices ranging from $8.65 to $9.75 per ton for the domestic coals, depending upon place of delivery; $7.75 to $7.95 for pea coal; $5.97 to $6.36 for buckwheat No. 1; $5.32 to $6.25 for buckwheat No. 2, and $4.75 to $6.75 for buckwheat No. 3, depending upon point and mode of delivery.

Current quotations, per gross ton, f.o.b. Tidewater, at the lower ports are as follows:

	Circular	Individual
Broken	$4.95	.....
Egg	4.95	$4.95@5.15
Stove	5.20	5.20@5.40
Nut	5.25	5.25@5.45
Pea	4.00	4.30@4.50
Buck	2.75	4.00@4.25
Rice	2.20	3.50@3.75
Barley	1.95	2.65@3.00
Boiler	2.20	.....

Quotations at the upper ports are generally 5c. higher on domestic coals on account of the difference in freight rates.

Bituminous—There has been a further drop in prices here, much of which is attributed to the settling of the railroad trouble and a further easing is expected unless the mine workers in the Pennsylvania regions decide to stop work. This is not, however, considered likely. A meeting of the operators was held at Clearfield on Thursday of this week (Apr. 5) at which the demands of the mine workers were considered.

Selling is slow. Consumers are not anxious to stock their bins although they are being urged to do so. Supply at the New York Tidewater is not large, but there is enough to take care of all immediate demands. Contracts are being taken care of and the railroads and large consumers are picking up all the free coal possible.

Operators are holding back on contracts and are not willing to tie up their entire output. Some contracts will not be renewed and others have been cut down to such an extent that the consumer will have to rely on open market purchases for a portion of his requirements. No operator is likely to tie up more than 50 per cent. of this output, while some of them have not closed for more than 25 per cent. and a few have turned down all contract business. Selling agents have received many inquiries from old and prospective new customers but are going slow. One small tonnage involving summer delivery was reported as having been closed at $3.75 at the mines, and another lot for a high-grade coal was reported closed at $4.25. The city opened bids for a small quantity of semi-bituminous and received prices ranging from $7.15 to $8.50 per ton, depending upon delivery point.

Current quotations, per gross ton, f.o.b. Tidewater, for various grades are as follows:

	Port Reading	South Amboy	Mine Price
George Crk. Big Vein	$6.75@7.25	$6.75@7.25	$5.00@5.25
Tyson	6.50@7.00	6.50@7.00	4.50@4.75
Clearfield	6.25@6.75	6.25@6.75	4.50@4.75
South Frk	.....	7.00@7.50	5.25@5.75
Nanty Glo	.....	6.75@7.25	5.00@5.25
Som'r. Co	6.50@6.75	6.50@6.75	4.75@5.00
Que'ho'ing	6.75@7.00	6.75@7.00	5.25@5.50
W. V. Fa'rm't Th'r'qua	6.50@6.75	.....	4.00@4.75
Mine-run	6.50@6.75		4.25@4.50
West. Md.	6.25@6.50	6.25@6.50	4.00@4.25

PHILADELPHIA

Anthracite spring prices upset trade and quotations on pea cause surprise. Leading company not followed. Pea coal being adopted for steam use at increased prices. Dealers uncertain as to their circulars. Steam prices announced, but no contracting to be done. Bituminous prices drop again. Little April contracting and that at $4

Anthracite—It has been many a year since there has been so much uncertainty in the business as at the present time. The announcement by the largest company that their circular price for pea coal during April would be $2.30 per ton completely upset the market. The announcement of the 50c. reduction on the prepared sizes was not unexpected and this part of the circular has since been adopted by all the producing interests. On pea coal all the companies seem to be following their own method, which badly shatters the precedent that the big company sets the prices and others follow. There is no justification for the reduction of the pea price, as all the companies are already behind on their orders on this size at the old rate.

The shipping companies made extra heavy consignments of prepared coal last week, so that if the dealers at once start to grant the public the benefit of the 50c. discount, together with the 25c. freight rate reduction, which became effective Apr. 2, they stand to lose 75c. on each ton of this coal. In addition if they go ahead and accept unlimited business at the new figures they will be selling at a price at which they will be unable to obtain any guarantee of securing. Shippers are particularly careful to notify all buyers that the prices quoted are for April only, and while it is reasonable to suppose they will advance only at the rate of 10c. per ton per month, they are not committing themselves.

But it is the pea coal situation that is causing the dealers the greatest concern. They have all come to the conclusion that they can expect very little coal at this price during April and while the company is taking heavy orders from its old customers, the latter openly state that they expect to receive only a very small portion of their needs. The trade has not prepared itself for a reduction on this size and would undoubtedly have been more at ease if there had been none.

One of the other large companies has come out with a pea coal price of $3, with a reduction of 50c. for April, which would indicate that the winter price would be $3.50. Still another of the large companies is reported as being ready to issue a figure of $3.50 flat. Practically all the individuals, while accepting orders for April at from $2.80 to $3 for this size, are known to be contracting on the basis of $3.25 and $3.50 a ton for steam trade and really expect to have very little coal for their domestic trade except such as care to close contracts on this basis.

Naturally such a condition makes the retailers anxious, particularly, as it is difficult to reconcile the pea price of the big compay with their recently announced price of $2.50 for white ash buckwheat. It has also been pointed out that while the April price of Reading Lykens Valley

pea is $2.75 the same grade of buckwheat for this month is $3.35 at mines. It is these inconsistencies that harass the dealers, and it would not be surprising to hear of the dealers with the larger storage capacities contracting for pea at $3.50.

It is also pointed out that pea coal at any price from $3 to $3.50 is particularly desirable as steam fuel, for with the freight reduction to Philadelphia and vicinity from $1.40 to $1.25 per ton it really becomes a most profitable purchase, when compared with a contract price of $3.25 to $4 for soft coal, and with the lowest freight rate for the latter $1.60.

The first week of this month has brought the anticipated rush of business to the big companies and sales agents are making efforts to prune requisitions and keep the orders within reasonable bounds. The delay in the announcement of the new rates by the dealers has prevented the usual heavy demand on them by their customers, but as several of the largest retail men have announced their prices in the papers the demand is growing rapidly. As illustrating the opinion of the retail trade one of the largest companies in announcing its prices through the advertising columns of the local papers, stated that these figures would apply to their old trade only and that prices would be subject to change without notice. The price of pea coal as announced by this concern was given as $6 per ton and comes as quite a shock to those people who expected to get it for $5.25 or less during April.

Steam coal users also received a shock when the new prices for those grades were announced, but not so much at the prices, as because of the fact that no contracts would be made. The prices as given out for current shipments are as follows for line delivery: Buckwheat $2.50, rice $2, boiler $1.80 and barley $1.50, and it seems that the other shipping companies, at least the larger ones, will dispose of their product in a similar manner.

The prices per gross ton f.o.b. cars at mines for line shipment and f.o.b. Port Richmond for tide are as follows, for April. In giving the price of pea we have endeavored to strike an average of the prices current at this time, although we think that a majority of the tonnage averages even a trifle higher:

	Line	Tide		Line	Tide
Broken	$4.50	$5.65	Buck	$2.50	$3.40
Egg	3.65	4.75	Rice	2.00	3.00
Stove	3.90	5.10	Boiler	1.80	2.90
Nut	4.00	5.05	Barley	1.50	1.75
Pea	2.80	3.70			

Bituminous—Prices have continued to ease off, the change running from 25c. to 50c., the heavier decline being on the better grades, with the consequence that now there is only a difference of about a dollar between the highest and lowest. There has been no particularly heavy buying this week, which may in a measure account for the continuation of the decline. Some interests profess to believe that the downward movement may continue for several weeks until a further change of at least 75c. is effected. Of course this is all conjecture and mostly based upon the fact that declines usually occur at this season of the year in ordinary times. However, these are not ordinary times and no one knows what the future may bring. There has already been one disappointment and that is the prediction of a few months back that contract prices would likely be lower around Apr. 1. As it now turns out what little contract business is being closed is being taken at $4 rather than the $3.50 price announced Jan. 1.

Receipts this week have been rather light. This is due probably to labor troubles which are springing up in many districts and is materially cutting into the production. Recently union officials have been extremely active in the Georges Creek district, and fomenters of trouble are also extending their activities to the Fairmont district, which has usually been quite passive to the agitator. In addition, owing to rail congestion, 20,000 men have been idle for almost a week in the Monongahela district. The car supply also continues to be very much restricted in all districts shipping to this city.

The fact that the railroads are asking for increased rates on bituminous coal, which would affect rates to this city about 15c. a ton, does not seem to have provoked much concern, and there seems to be a strong likelihood that the increases will eventually be granted. This would still further widen the gap between the rates on bituminous and anthracite coal and to the great advantage of the latter, which owing to the recent reduction is now being brought into this city on a $1.20 rate for buckwheat.

The prices per gross ton f.o.b. cars at mines are as follows:

Georges Creek Big Vein	$5.25@5.50
South Fork Miller Vein	5.25@5.50
Clearfield (ordinary)	5.00@5.25
Somerset (ordinary)	5.00@5.25
West Va., Freeport	4.75@5.00
Fairmont gas lump	4.75@5.00
Fairmont gas, mine-run	4.50@4.75
Fairmont gas, slack	4.25@4.50
Fairmont lump, ordinary	4.50@4.75
Fairmont mine-run	4.25@4.50
Fairmont slack	4.25@4.50

BALTIMORE

Everything is hinging on development of war conditions. Bituminous market comparatively firm, and anthracite uncertain.

Bituminous—Pending at least a partial shakedown in the industrial world due to war conditions, the coal trade here is more or less in the air. The receipts of bituminous coal at tide are comparatively light and are readily absorbed when offered, at prices still above those quoted at the mines for delivery. The range of this spot coal is fairly wide and dictated by the individual necessity.

Already the call of the militia to the colors threatens to carry off a number of men interested in the trade, and should drafting come later a great labor scarcity might upset all calculations. Even at present the labor situation is bad, as shown by the fact that miners in the Georges Creek region, but recently granted a ten per cent. increase in pay, are now preparing to demand an eight-hour day. Prices at tide for spot steam coals range generally about a dollar in advance of mine quotations for delivery.

A flood of orders for yearly contracts is staring each coal man here in the face and but few are willing to take contracts in the face of the uncertain situation. Some few are placing contracts with their best customers, but in part only; few are granting more than fifty per cent. of the amounts asked. Prices for steam coals over the year are maintained at from $3.75 to $4 generally.

Quotations at the mines for delivery to the trade are about as follows: Georges Creek Tyson, $4.50; Somerset, $4 to $4.25; Quemahoning, $4.25; Clearfield, $4; Freeport, $3.75 to $4; Fairmont gas, three-quarter, $4; run-of-mine, same, $4; slack same, $3.50.

Anthracite—While the Philadelphia and Reading Coal and Iron Co. has announced the usual April discount there are as yet no quotations on broken sizes, and in addition other companies have entirely withheld schedules so far. The probabilities are that no effort will be made to sell locally at a cut figure until after the middle of the month. This time would be needed in any event in order to catch up on yard supplies.

Exports—This feature of the trade is almost negligible only a vessel or two a week now clearing. The coastwise trade also is light all the coal coming through being readily absorbed here at good prices.

Ocean Shipping

OCEAN FREIGHTS

Steamers to take coal to French and Italian Mediterranean ports are almost unobtainable, but there are a number of boats in the market desiring coal to Spain, which boats are willing to accept reasonable figures. Owing to the absence of business from the Plate, rates outward are particularly firm, and steamers difficult to obtain, even at the advanced rates that are now offered. We have chartered a number of steamers recently to Rio and additional tonnage is obtainable at advanced figures. Steamers are asking $18 to the West Coast, which rate we think can be shaded. Rates to the West Indies and Cuba are practically the same as a week ago, and since our last report we have chartered numerous steamers for these destinations at rates recently quoted.

We would quote freight rates on coal by steamer as follows:

	Mar. 26	Apr. 2
Europe		
West Coast Italy	$55.20@62.40	$60.00@66.00
Marseilles	55.00@62.40	60.00@66.00
Spanish ports*	22.80 about	22.80@27.60
Spanish ports (At'lic)	27.60	

Note—Charters for Italy, France and Spain read: "Lay days to commence on steamer's arrival at or off port of discharge."

South America		
Montevideo	25.20@26.40	26.40 about
Buenos Aires	25.20@26.40	26.40 about
Rosario	27.60 about	27.60@28.80
Rio Janeiro	[3]20.00 about	[3]21.00 about
Santos	[3]21.00@22.00	[3]22.00 about
Chile (good port)	16.00@17.00	17.00@18.00
West Indies		
Havana	5.00 about	5.00 about
Cardenas, Sagua	7.00 about	7.00 about
Cienfuegos	7.50 about	7.50 about
Port au Spain	10.00 about	10.00 about
St. Lucia	10.00 about	10.00 about
St. Thomas	8.00@ 9.00	8.00@ 9.00
Barbados	10.00 about	10.00 about
Kingston	7.25 about	7.25 about
Curacao[1]	8.00 about	8.00 about
Santiago	7.50 about	7.25 about
Guantanamo	7.50 about	7.25 about
Bermuda	7.50 about	7.50 about
Mexico		
Vera Cruz	8.50@ 9.50	8.50@ 9.50
Tampico	8.50@ 9.50	8.50@ 9.50

* Spanish dues for account of cargo. [1] And p.c.
[2] Or other good Spanish port. [3] Net.
W. W. Battie & Co.'s Coal Trade Freight Report.

COASTWISE FREIGHTS

No change is heard on rates from Hampton Roads to Boston; $4@4.25 is the range for the few steamers available, and this only for single trips; $3.75 has been named on 1000-ton barges for prompt loading, 50c. less being asked for Providence. Inquiry on this basis is still light.

New York loading for Boston is still quoted at $1.75, and for sound ports $1.15 is the prevailing rate. Coasting vessels command rates up to $2 for Eastern points.

Lake Markets

PITTSBURGH

Market softer and stiffer again, but generally lower than a week ago. Car supplies moderate. Contract market stagnant.

Car supplies improved last week and in the last two or three days of the week were sufficiently good to break the spot market by about 50c., but this week has not opened up well and with a heavier buying demand the market has stiffened about 25c., making it on the whole about 25c. lower than given in our last report. It is understood that two of the largest steel interests are in the market this week for spot coal, this being the chief reason assigned for the stiffening in the market.

This is the month of the year when spot coal prices should, in normal conditions, be at about their lowest as the weather is favorable for railroad movement and everything is being tuned up for the opening of the Lake season. Labor supply is usually better also, as no men have yet been drawn off for outdoor work. The present spot market is regarded as lower than the average is going to be over the next 12 months, hence operators are quite indisposed to make twelvemonth contracts at the present spot prices. Buyers are almost as reserved as sellers and hence there is hardly any contract market. For gas, $3.50 has been paid but quotations are running higher now, though there is practically no bidding for steam at $3.50.

Nothing definite has occurred as to the demands of the men for a "bonus" on account of the high cost of living, but it seems probable that by the time this thing is threshed out the men will be receiving more than called for by the scale signed to Apr. 1, 1918.

We quote spot at $3.25@3.50 for slack, $3.25@3.50 for steam mine-run and $3.75@4 for ¾-in. gas, per net ton at ovens.

BUFFALO

Bituminous somewhat firmer. Better car supply, but shipments to the Lakes are beginning. Reduced anthracite prices will keep up demand. No Lake coal here.

Bituminous—The situation has taken a stronger turn, probably on account of so many shippers turning to the Lake trade, which is in urgent need of coal. The demand is looked upon as light in this market, but there is a good volume of coal moving. A decided change in the situation is taking place now on the expiration of so many contracts, which the shipper has refused to renew at any price. Losses to shippers have been so great in this direction that many of them are holding off and may not make any contracts this year. The turn to the Lake markets has firmed up No. 8 somewhat and the big Eastern demand does the rest. There is no falling off in consumption and if the buyer is holding off it is because he believes the long car delays are over and he can buy on better deliveries. It means that he anticipates a further decline in prices, though shippers take a contrary view.

There is an increase of labor difficulties in all the mining regions. In the Allegheny Valley and Reynoldsville districts the men have demanded an advance of 33⅓ per cent., in spite of the fact that they have had a raise or two since the prices were made last April for two years and it looks as though they would get it. The operators at first refused to meet them, but are now going in. Quotations are stronger, figures being per net ton, f.o.b.

Youghiogheny Gas	$5.00@5.10
Pittsburgh Steam	4.50@5.00
Bessemer	4.00@4.50
Allegheny Valley	3.75@4.25
Ohio No. 8	3.50@4.00
Cambria Co. Smithing	4.00@4.50
Pennsylvania Smokeless	3.85@4.35
All Slack	3.40@3.90
Cannel	5.50@6.00

Everybody is exceedingly shy about reporting bituminous contracts, so that it is not supposed that the average tonnage has been put in. This adds to the unsteadiness of the trade generally and makes both buyer and seller uneasy. Jobbers agree that $3 net is a good contract price, but the mine owner generally holds off.

Anthracite—The orders are coming in fast on the price reduction. Before it was known that there was to be a special April price the buyers did not quite know what to do and hesitated, but now the shippers will have all they can do and will not find it easy to get any surplus for the Lake trade. The time for loading has

arrived, for the Lake ice is going fast. Half a dozen cargoes of grain which were wintered at Detroit and Port Huron will not have to wait till the Straits and the Sault are open.

The local anthracite trade is quiet and there is no further clamor from Canada, but the supply is everywhere scant and it will take a large tonnage to put the consumer on the usual summer footing. It is believed that he will buy more than ever before, so it is safe to predict a big April trade. The independent jobbers are taking good orders, but at circular prices. They have enjoyed a profitable trade during the winter, limited only by the lack of coal and cars.

Every effort will be made to get a good supply afloat early, but that will all depend on the mining and the car supply. The shippers are making no Lake rates. They are aware that they must pay more than formerly, but commonly wait for the bituminous shippers in Ohio to make the rate.

TORONTO, CAN.

Coal coming forward freely. Market easier. Lower price for anthracite anticipated. Increased shipments by water arranged for.

Market conditions have improved much lately with supplies coming forward more freely and prices of bituminous considerably lower. Owing to reductions of anthracite prices in the United States it is anticipated that a corresponding drop in present rates will take place here before long. Two freighters which wintered here are preparing to go into the coal trade between Toronto and Charlotte each making two trips weekly, which will increase the supply by about 8000 tons per week.

Quotations for best grades per short ton are as follows: Retail anthracite, egg, stove and nut, $9.50; grate, $9.25; pea, $8; bituminous steam, $9.50; slack, $9.50; domestic lump, $10; cannel, $10. Wholesale f.o.b. cars at destination, three-quarter lump, $7; slack, $7.

DETROIT

Easing off in demand for domestic coal leaves market over stocked and causes a weakening in prices. Car shortage holds back Lake coal.

Bituminous—Producers have continued shipments in winter volume, producing an over supply of coal in the market, in consequence of which prices have softened and difficulty is being encountered in preventing accrual of demurrage. The situation is complicated further by the arrival of delayed shipments which has given a number of industrial consumers more coal than they require for present needs. With such reserves on hand consisting of coal bought at higher prices than are now obtainable, the consumers in some cases, show a tendency to be dissatisfied, and are not in receptive mood for further commitments.

West Virginia and Ohio slack, lump and egg are offered at $2.75 to $3 at the mines, while mine-run from the same fields is obtainable at $2.25 to $2.50. Smokeless lump and egg are less plentiful and carry a quotation of about $4 at the mines.

Anthracite—While the quantity of anthracite arriving has not greatly increased the lessened demand from consumers, places some of the retail dealers in the position of having more stock on hand than they are able conveniently to handle. In view of the discount announcement by the Philadelphia & Reading, the retailers are confident they will be able to get whatever stock they require cheaper from now on.

Lake Trade—Though no authoritative statement has been issued, it is understood in some quarters that vessel owners will be obliged to pay from $4.90 to $5 a ton for fuel coal delivered on docks, this season. Car shortage is delaying movement of cargo coal to loading docks.

CLEVELAND

Spot market soft, but good demand for contract coal. Car supply improving. Several large contracts closed.

The spot market has been very weak the past few days, mainly for the reason that the car supply has been much better, giving most of the mines about 60 per cent. of their capacity. Another feature affecting the local steam market is the fact that a large number of Cleveland manufacturing plants will not require as much coal after Apr. 1, as natural gas will be available for fuel after that date and during the summer months.

While the spot market has been soft, the contract market has been very active and several contracts for Pittsburgh No. 8 coal have been closed at prices ranging from $2.50 to $3 per net ton f.o.b. mines. It is reported that the price for steamboat bunker fuel will be $5, when loaded at dumping machines with an extra charge of 15c. per ton when loaded from lighters. Cargo coal, it is said, will be about $4.25 f.o.b. vessel, lake Erie ports.

Following are the market prices per short ton:

	Three-quarter	Mine-run	Slack
No. 8	$3.50	$3.50	$3.50
Cambridge	3.50	3.50	3.50
Middle Dist.	3.50	3.50	3.50
Hocking	3.25	3.25	3.25
Pocahontas	....	4.50	....

TOLEDO

Market softer but opening of navigation will stiffen prices up.

There is little hope for cheaper coal after the opening of navigation on Apr. 16. The demand for Lake coal is already brisk and some doubt is expressed as to whether the supply will equal the requirements. Spot prices are a little soft at present and the market is unsteady. A request to start Lake shipments immediately has been made by some of the dealers and if this should be done a material rise in price is expected.

The embargoes have been lifted by most roads in the north and only the N. & W. and Pennsylvania now have embargoes against coal. These embargoes, however, affect only the mines in Eastern Ohio. The Hocking Valley is giving a liberal supply of cars as are several other roads in the southern part of the state. Coal from Kentucky is reported as coming through without much delay.

COLUMBUS

Quotations lower and market quiet as operators and shippers watch the trend of events. Contracting progressing slowly.

During the past week the coal trade has been rather quiet. Producers, shippers and retailers are waiting to determine the trend of the market before going ahead. Steam business has been attracting some attention although little contracting is reported. The market is in a waiting condition, though prospects for the future are rather bright.

Retailers are preparing for an early stocking season and householders, who were caught last year, are expected to come in earlier for their winter's fuel supply. Apr. 1 prices are at a lower level than the quotations which have prevailed for the past few months.

Steam business is one of the strongest points in the market. Manufacturing is still active and the demand for fuel is as strong as formerly. Surplus stocks are not large, although some of the larger consumers have taken advantage of the better car supply to accumulate some reserves. Contracting is not active, excepting for Lake shipment. Both the seller and the buyer are loath to enter into long-time contracts under present conditions. Buying in the open market will be the feature for the early part of the season at least. Railroads are taking a large tonnage for freight movement. Railroad contracting is attracting some attention as many of the roads have invited propositions.

The Columbus board of purchase has awarded the contract for the coal supply for the various city departments for the month of April to the Fletcher-Williams Coal Co., at $2.59 per ton for Hocking nut, pea and slack delivered and to the George M. Jones Coal Co., at $2.80 per ton for Hocking nut, pea and slack. For a small amount of lump coal for the fire department the city pays $3.15 to the Fletcher-Williams Co.

Prices on short tons, f.o.b. mines, are as follows:

	Hocking	Pomeroy	Eastern Ohio
Rescreened lump	$3.00	$3.00	.....
Inch and a quarter	3.00	2.75	$2.75
Three-quarter inch	2.75	2.75	2.75
Nut	2.75	2.75	2.75
Egg	2.50	2.75	.....
Mine run	2.50	2.75	2.50
Nut, pea and slack	2.50	2.50	2.50
Coarse slack	2.50	2.50	2.50

CINCINNATI

Continued warm weather has softened the market materially, except for contract demand, which continues heavy. Car situation has improved somewhat.

Continued warm weather, with indications that spring has definitely arrived, has had the usual result of causing demand to slack off substantially, especially with the retail trade; some effect is also observed in the industrial trade, as the lessening need of heat in factories has brought about a slightly reduced consumption. However, the call for steam coal is still heavy, and in many respects is beyond the ability of the trade to supply it, due principally to the fact that the car supply is still far below requirements. The situation as to cars is slowly improving, but with the Lake shipping season just ahead, there is no prospect that the railroads are going to be able to furnish the necessary rolling stock for some time to come.

The demand of large consumers for contracts, even at the current high prices quoted, continues heavy, and indications are that the average prices will be at a level never before equalled. Operators are considering the situation carefully, and are not inclined to hurry.

LOUISVILLE

Domestic demand slowing up with general passing of winter weather. Labor supply causing apprehension. Demand for steam coal continues large.

The first part of April finds an easier market for domestic sizes, with the demand for steam coal really increasing and contracts being more or less generally discussed and closed up. The demand for labor on all sides is giving the operators a good deal of concern at this time. A shortage on the farms and a continued emigration northward, with the tendency to increased scales of wages is remarked everywhere. A general enlistment movement would further tend to reduce the supply. Car supply conditions are more satisfactory than for some time.

Eastern Kentucky prices, f.o.b. to mines, range block, $3.25; mine-run and nut and slack, $3.25 @3.50. Western Kentucky prices are tending downward, lump ranging below $2 as a rule; mine-run, $1.50@1.60; nut and slack, $1.40@1.50.

Eastern and Southeastern Kentucky contract prices are ranging from $3 up. One leading operator reports that he had heard of no contracts below $3. Western Kentucky operators are bidding on contracts, although it is stated that they are generally going too high to suit the consumer. Consumers appear to be slow to close and operators are to a considerable extent uncertain as to what course the market will take.

BIRMINGHAM

Contract business becomes active and takes precedence over spot market, which is quiet. Domestic dealers cover their requirements. Car supply as a whole better than last week, though still very inadequate.

Contract consumers of steam coal have shown decided activity during the past week in their endeavors to close deals for their supply, and a large aggregate tonnage has been booked. Cahaba screened coal 3 in. and under has been sold at $3 per ton mines, and Pratt mine-run at $2.75. One of the larger rail lines has taken as much as 10,000 tons of mine-run coal in the last month at $2.25 per ton mines to supplement its monthly contract quota, and all the railroads are short on fuel and buying supplemental tonnage in the spot market. The A. B. & A. railroad has contracted for approximately 135,000 tons recently at $2 per ton mines for Cahaba screened and Pratt mine-run coal, the old contract price being $1.25 to $1.35 per ton, the new contracts running from Mar. 1, 1917, to July 1, 1918. Industrial interests are paying from $2.50 to $3 per ton mines for contract coal.

Prices on steam grades are as follows per net ton mines: Big Seam mine-run, $2.75@3; washed mine-run, $3@3.25; Carbon Hill mine-run, $2.75 @3.25; washed mine-run, $3@3.25; screenings, $2.75@3; nut, $3@3.25; Cahaba mine-run, $3.25 @3.50; Black Creek mine-run, $3.25@3.50; washed mine-run, $3.50; Pratt mine-run, $3.25@ 3.50. Blacksmith coal, $4.50@5 mines.

Brokers report that domestic dealers are rapidly placing orders for winter stocks on basis of the circular prices effective Apr. 1, some covering their requirements for six months and others for twelve months, and the large tonnage of the domestic mines thus being thrown back into its normal trade channel is expected to further strengthen the steam market.

The car supply has been better as a whole but is still far from satisfactory.

Coke

CONNELSVILLE

Production and shipments increased. Spot market lower. Sellers indisposed to contract. Labor shortage discussed.

Car supplies are reported unsatisfactory this week, particularly in the case of box cars, but the spot market is easier nevertheless, by 50c. on furnace and $1 on foundry, as compared with a week ago. There is not much buying demand and the market is made by small offerings. Operators sell at any price that chances to be going, not being able to hold back coke even for a day or two waiting for a better market.

There is no interest in contract furnace coke, consumers not inquiring to any extent while the great majority of producers do not care to quote on contract, in view of the risks involved. They feel that what coke they can make and ship will be disposed of, no matter when they sell it. The foundry coke contract market has become very narrow, consumers not covered for the second half preferring to wait while producers have been withdrawing prices. One has a flat price of $9 for second half and has effected one sale. A few might quote $8.50. We quote the market as follows: Spot furnace, $8@8.50; contract, nominal, $7@8.50; spot foundry, $10@ 10.50; contract, $8.50@9, per net ton at ovens.

At some operations labor is a trifle scarce this week, owing, it is thought, to preparations to celebrate the Easter holidays. It is held that men will soon be drawn to outdoor work, on the roads, etc., and that if cars become more plentiful labor scarcity will be the governing influence in coke production.

The "Courier" reports production in the Connellsville and lower Connellsville region in the week ended Mar. 24, at 368,664 tons, an increase of 10,595 tons, and shipments at 370,313 tons, an increase of 13,629 tons.

Buffalo—Prices remain firm, as there is demand for the output elsewhere and it is not expected that the consumption will drop off or the supply increase right away. The car supply is a little better, but not good enough to affect the prices, which are still on the basis of $11.85 for Connellsville foundry and $9.85 for furnace and the lower grades.

St. Louis—Domestic coke went out of sight on Apr. 1, when the dealers were quoted $9 f.o.b. ovens for gas house coke per ton and $10 for byproduct. In the past prices were made delivered in the yards in St. Louis, but the dealers will pay the switching this year. There is very little byproduct offered even at those prices, and none to take care of the industrial demand here. A good call prevails for Southern and Eastern foundry at the top of the market.

Birmingham—The acute demand for coke and the shortage in the supply has forced prices still higher and spot foundry is now being quoted at $15 per net ton ovens, a nominal tonnage having been sold at this figure. Furnace coke in the spot market is worth from $7 to $7.50, with little to be had. Smelting interests were in the market for coke to be shipped to southern Texas territory for reconsignment to points in northern Mexico. The Gulf States Steel Co. is effecting an organization for the operation of its 37 Kopper byproduct ovens at Gadsden, which will be placed in commission very shortly.

Middle Western

GENERAL REVIEW

Prices show slight decline but general trend of quotations for future deliveries very strong. Lake season will be very late. Contracting uppermost.

A mixed situation has developed with a perceptible tendency towards a softening in prices on spot coals. April prices are being announced by prominent Illinois and Indiana operators, with the general quotation of $3 for domestic sizes; $2.75 for steam lump, and $2.50 for the smaller steam sizes with mine run at from $2 to $2.25.

There is still more of a disposition on the part of operators to decline contracts. Wholesalers and shippers seem to be unable to make up their minds as to prices, and are not sure that they will be able to obtain enough cars and labor next fall and winter to meet their obligations. Retailers are getting under cover as fast as possible but are not able to obtain near as much tonnage as they had last year. The railroads are also anxious to protect their requirements but a number of them are holding out for concessions.

Inquiries for tonnage from consumers for all kinds and grades have swamped the wholesalers, and the slow tactics of the operators in quoting prices is causing more or less uneasiness on the part of buyers. The operators have contracts for supplies at the mines expiring very shortly which are either being renewed at increased prices or are not renewed at all and they are obliged to purchase these in the open market at unheard of quotations; for that and many other reasons they feel that they should exercise caution in quoting prices for future deliveries of coal.

Retailers' supplies are very low, and no particular effort will be made toward replenishment until some time later. The weather has become mild and springlike and the retail business is quiet. Complaints here and there still show an insufficient car supply; it was thought that as soon as spring opened up cars would be more plentiful, but if anything the situation is exactly the reverse. Empties are scarce at southern Illinois and Indiana mines, and it is reported that there is less coal equipment in the Illinois and Indiana coal fields than at any time for several months past.

It is thought that navigation will open at the head of the Lakes on about May 1. The ice is unusually thick for this time of year, but on account of the coal shortage the marine men are preparing to make special efforts to open up passages by the use of ice breakers or dynamite. One steamship line is reported to have taken a large contract to carry coal to the head of the Lakes at 50c. per ton from lower Lake ports.

With heavy industrial requirements in the Northwest and absence of reserve stocks, the Lake season is bound to be a strenuous one. All dock shippers fear that they will find great difficulty in obtaining their usual allotments, and a general rush when navigation opens is inevitable. Lake coal will probably not begin to move from West Virginia or eastern Kentucky mines until the latter part of April because of the short car supply, heavy Eastern demand and shortage of labor.

CHICAGO

New April circular prices announced to Chicago trade. Indications point to strong market for spring and summer months.

Some of the Franklin County operators have issued circular prices for April and May delivery as follows:

	April	May
Chunks	$3.00	$3.25
Furnace	3.00	3.25
Nut	3.00	3.25
Special and stove	3.00	3.25
Chestnut	2.75	3.00

The demand for southern Illinois coal has continued strong because operators have been busy filling old orders. Buying of southern Illinois coal from the Chicago market is about as heavy as from any section of the country, and tonnage is moving very freely to Northwestern points. Car shortages still exist at all mines. Some of the Williamson County operators have offered shipments for April delivery on a basis of $3 for domestic lump and egg, and washed sizes. Operators show no disposition to attempt contracting on steam sizes, and evidently intend to market a considerable part of their output as free coal. Saline County operators will ask $3 for lump, $2.75 for steam lump, and $2.50 for mine-run in April.

In the Springfield district the Peabody Coal Co. has issued a circular of April prices as follows: Domestic lump, $2.50; steam lump and egg, $2.25; mine-run and screenings, $2.

In Indiana some of the influential operators have issued new circular prices for April showing the following quotations: Nos. 5 and 6 domestic lump, $2.50; Nos. 5 and 6 steam sizes, $2.25; No. 4 steam sizes, $2.50; No. 4 domestic lump, $2.75.

It is understood that some West Virginia operators will withdraw from the Lake trade this season on account of the increase of 15c. in the freight rate and the considerable advance in the cost of handling and vessel charges, amounting to approximately 35c. Several companies heretofore engaged in Lake trade have decided to divert their tonnage toward the seaboard or other interior points. Smokeless coals are likely to be very strong during the month of April. Some business has been booked for April delivery at $4 for mine-run and $4.50 to $4.75 on prepared coals. Some mine-run tonnage has been covered by contracts on a basis of $4 for the year. A little Pennsylvania smokeless mine-run is being received here which is readily sold at $4, but no April prices have been announced on Pennsylvania shipments.

Indications are that Hocking and splint lump will be quoted at $3.50 for April delivery. The current market is firm at $3.75 to $4. Eastern Kentucky coals have been quoted in Chicago this week at prices ranging from $3.50 to $4.50 for lump and egg, with no expression as to what prices will obtain next month.

Anthracite arrivals are still scant. Independents are obtaining premium prices, while the old line companies cannot satisfy the demand. New circular prices issued in the East have not been distributed to the trade in Chicago, but it is very likely the same quotations made by the P. & R. C. and I. Co. which allows a discount of 50c. a ton for April delivery, will be announced in Chicago very shortly.

Quotations in the Chicago market are as follows, per net ton f.o.b. cars at mines:

	Springfield	Fulton & Peoria Cos.	Clinton & Sullivan Cos.	Green & Knox Cos.	Carterville
Domestic lump	$2.50@2.75	$2.50@3.00	$3.00@3.50	$3.00@3.50	$3.25@4.00
Steam lump	2.00@2.25	2.00@2.25	2.00@2.50	.....	3.00@3.75
Egg	2.25@2.50	2.00@2.25	2.75@3.25	3.00@3.50	.....
Nut	2.25@2.50	.....	2.25@2.75	.....	.....
Mine-run	1.75@2.00	2.00@2.25	2.25@2.50	2.75@3.25	.....
Screenings	1.50@2.00	1.75@2.00	2.00@2.25	2.25@2.50	.....

	Williamson & Franklin Cos.	Saline & Harrisburg	Poca. & W. Va. Smokeless	Penna. Smokeless	Eastern Kentucky
Lump	$3.50@3.75	$3.50@3.75	$4.00@4.25	.....	$3.50@4.25
Egg	3.50@3.75	3.50@3.75	4.00@4.25	.....	3.00@4.00
Nut	.....	3.00@3.50	.....	.....	.....
No. 1 nut	3.50@3.75	.....	.....	.....	.....
No. 2 nut	3.50@3.75	.....	.....	.....	.....
No. 3 nut	3.50@3.75	.....	.....	.....	.....
No. 1 washed	3.50@3.75	.....	.....	.....	.....
No. 2 washed	3.50@3.75	.....	.....	.....	.....
Mine-run	3.00	2.75@3.00	3.75@4.00	3.50@4.00	.....
Screenings	3.00	2.75@3.00	.....	.....	.....

Hocking Lump $3.75@4.00. Splint Lump $3.75@4.00.

ST. LOUIS

Continued warm weather, good car supply and restricted equipment force prices down. Domestic demand very light and steam about normal. No country calls. Anthracite and smokeless out of market.

The weather has been so warm that there has been no domestic demand for coal locally, which has thrown the entire tonnage into the steam market. Most yards are well stocked up in anticipation of cool April weather, and the steam trade is also well supplied. Car supply on most roads has been exceptionally good. The Illinois Central fell down this past week on cars, but all other roads showed improvement.

In the Standard field coal in restricted equipment sold as low as $1 for 2-in. lump, and coal from Williamson and Franklin County got down to as low as $1.60 for domestic sizes in restricted equipment; on the other hand, this latter coal sold in the country as high as $3, but the demand for high-priced coal has practically disappeared, and there will not be much tonnage moving until later for dealers storage, and it is questionable as to what the tonnage will be then.

The Iron Mountain is understood to have permitted equipment to go through to Chicago when the consignee was the Consumers Fuel Co. or the Chicago Edison Co. When consigned to other parties the embargo was not raised, and it said that this action was taken in order that the road could buy several thousand tons of storage coal at their own figure, but as its contracts were made last spring, for two years, this should not be a factor in the placing of the embargo. The embargo is causing high grade operators to lose about $1 a ton on every ton shipped into this territory over the Iron Mountain.

Movement on other roads has been normal and a ready market seems to prevail, although the outside prices are not as high as formerly. Steam conditions seem to show improvement. Railroads such as the Iron Mountain which have restrictions on their equipment claim that these are necessary in order to prevent their equipment from going all over the country.

Contracting is rather slow. The operators are hesitating to enter into large contracts that extend beyond July 1 at any fixed price. The largest deal of the past week was the sale of the output of T. C. Keller's mine in Franklin County, to the Burlington R.R. at, it is understood, $1.75 mines for mine-run. This amounts to about 2000 tons a day and the contract is for one year.

Several other contracts were closed in the Williamson and Franklin County field for steam sizes such as Nos. 2, 3, 4 and 5, at prices from $1.85 for No. 5, up to $2.35 for No. 3 and $2.40 for No. 2. A few minor steam contracts have been closed in this field for lump, egg and nut at not less than $2.50. Contract screenings are quoted at from $2.25 to $2.40. No dealer contracts are made.

In the Mt. Olive field contracting is slow, but a report is made of sales to three jobbers west of the Missouri River for several hundred cars to be shipped throughout the year for domestic purposes at the circular prices prevailing in each month. A few other contracts were made for steam lump in this district at $2.25 mines.

In the Standard field some screenings went at $1.75 mines for a year, and there are various prices as low as $1.50 on steam lump contracts. The largest sale on record this week was 100,000 tons of Standard steam lump to the Burlington, at $1.40 mines to be shipped between Apr. 1 and July 1.

The circular issued by nearly all the operators in the Williamson-Franklin County field shows lump, egg and nut at $3 for April, with mine-run and screenings at $2.75. These prices are from 75c. to $1 above what the operators figured a month ago the circular would be. It is likely the May prices will be either $3.15 or $3.25.

A considerable tonnage of coal has been bought by dealers for shipment in April, May and June for storage purposes at the prices prevailing during those months. The steam plants are also storing against the demand that will be hard to take care of in the late summer and fall.

There is no anthracite received, and nothing in the way of smokeless.

Considerable Oklahoma coal has arrived recently and some Arkansas, but this has practically stopped, as it will not come up to West Virginia for domestic purposes.

The prevailing circular in St. Louis for Apr. 1 is, with the exception of Williamson and Franklin County, about 25c. under the country price, and is per net ton f.o.b. mines:

	Williamson and Franklin Co.	Mt. Olive and Staunton	Standard
6-in. lump	$1.65@2.00	$1.85	$1.15@1.25
3x6-in. egg	1.65@2.00	1.85	1.15@1.25
2x3-in. nut	1.65@2.00	1.85	1.00@1.10
No. 2 nut	1.65@2.00	.....	1.15@1.25
No. 3 nut	1.65@2.00	.....	.....
No. 4 nut	1.65@2.00	.....	.....
No. 5 nut	1.65@2.00	.....	.....
2-in. screen	1.65@2.00	1.75	1.00@1.10
2-in. lump	.....	.....	1.00@1.10
3-in. lump	.....	1.75	.....
Steam egg	1.65@2.00	1.75	1.00@1.10
Mine run	1.65@2.00	1.50	1.00
Washed			
No. 1	.....	.....	.....
No. 2	.....	.....	.....
No. 3	.....	.....	.....
No. 4	.....	.....	.....
No. 5	.....	.....	.....

Rate on Williamson and Franklin County is 72½c. Rate on other fields is 57½c.